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BIRMINGHAM

WHEN they receive this issue of the "JOURNAL" many of our readers will, no doubt, be contemplating the packing of their grips in readiness for the 1947 General Meeting of the Institution of Gas Engineers. For such gatherings pilgrimage from the Metropolis since the first World War can be counted on fewer than the fingers of one hand—these pilgrimages being to Belfast, Cardiff, Leeds, and Liverpool. Each of these meetings was acclaimed a success, and the programme arranged for the meeting in Birmingham augurs well, though with the ever-increasing membership of the Institution it becomes more and more difficult efficiently to stage meetings of the kind to the benefit and convenience of all.

What, we may ask, will the stranger to Birmingham find? Perhaps his first impression, driving in the city, perplexity regarding traffic regulations which eat into restricted petrol supplies to a greater extent than the less orthodox Place d'E'toile. Then he will, no doubt, be struck with the paucity of accommodation for visitors. This, of course, applies to every provincial city in the United Kingdom. Yet, in common with many other cities, Birmingham offers within a stone's throw wonderful country, some of which will be seen during the Institution meeting. We have been privileged to visit Birmingham and its lovely countryside on many occasions over many years and have come to admire its tenacity of thought and its vivid awareness that culture allied to industry—whether or not any particular industry concentrates on the production of pans or the making of armaments, whether or not the culture is concerned with poetry, music, architecture, or social welfare—is necessary to progress. In this respect, Birmingham sets an inspirational example.

To-day, in a special—and, we hope, timely and fitting—supplement to our issue, we trace the growth of that great City of Birmingham. We think that the supplement will serve as pointer to the reasons underlying Birmingham's firmness and resolve; and we are sure that good fellowship will, during the meeting, surround the President of the Institution—and not only Mr. Pearson himself, but the General Manager, staff and the employees of the Gas Department, and the civic heads of a community alive to its responsibilities and willing to bear its burdens with abounding cheer.

"GLIMPSES BEYOND THE GLOOM"

IN one of those statesmanlike addresses which are characteristic of him, Dr. Evans set before the North of England Association, at Newcastle, the facts of the present position of the Gas Industry in this country and the short and long term problems with which it is faced. The immediate problem is that of curtailing the consumption of coal in the forms of gas and coke during the summer in order to build up stocks for the winter. Sir Ernest Smith, speaking in Manchester recently, protested against the treatment of gas and electricity in the same way, regardless of the differences between them in this respect. The obvious course would have been to reduce the supply of coal to both and leave each to work out its own method of rationing its consumers. But that, as Dr. Evans points out, would have led, in the Gas Industry, to reduction of pressures which in practice has an uneven effect throughout the distribution systems. He therefore, reluctantly one hopes, approves of the course adopted by the Government even though this may yield little or no overall saving of fuel.

That shortest of short-term remedies, the use of oil, is short-sighted indeed. But "economic madness" though it is, presumably we must go on with it at the present. Recent trials of direct gasification of oil in vertical retorts have shown that in this way the thermal output per unit of plant can be more than doubled—thus going some way to meeting the other difficulty, that of shortage of plant. This shortage is likely to get worse before it gets better. There is reason to fear that the output, for example, of refractory materials is no more than sufficient to keep up with normal repairs, leaving little or nothing for extensions which are rapidly becoming necessary. And manufacturers of appliances are equally, as Dr. Evans puts it, "often at their wits' end to obtain material."

There is the further danger arising from the lowering of standards due to the enforced necessity of making do with inferior substitutes. We are "getting away with" low standards in all directions. Gas appliances are being strained and twisted to tolerate variations in gas quality over ranges far beyond those within which reasonable efficiency is possible—"we must beware lest they (consumers) come to think of this inadequate performance as the best they can ever expect from gas and gas appliances." There is profound philosophy in this. We must beware too lest we accept to-day's standard of comfort and convenience in house heating and other domestic heat supplies when we know that it can be substantially raised, not only above its present miserable level but far above the pre-war standard, with a positive saving of coal, if only housing and its equipment are designed and constructed on the right lines. "However far we may have fallen from the standards we once set ourselves—it would be a major catastrophe if we lost faith in ourselves or in the Industry we serve."

We should be less than human if we did not somewhat enjoy Dr. Evans' twitting of our electrical friends about the troubles they have brought upon themselves—and the public—by their "policy of inappropriate development" of the domestic cooking and heating loads. The notion that this would be off-peak load has indeed been exploded by the incidence of the hours of restriction and load-shedding. In the long run it is imperative that the Government through its technical advisers should face up to the necessity for an overall fuel plan, directing each form of fuel, natural or

artificial, to the purpose which it can fulfil with the maximum efficiency. "There is no place for politics in our Industry," as Dr. Evans says, but who is to see that the control of the Gas Industry does not pass from the hands of its own skilled and experienced technicians into those of administrators in Government offices? The Minister has promised that this shall not happen. But the price of liberty, in this matter too, is eternal vigilance. Even if and when nationalization becomes an established fact there will be need for strong leadership to keep gas in its proper place among powerful competitors for ministerial favour. Our leaders must be ready and prepared to urge in the councils of the Government the fundamental principles of coal conservation, that all coal capable of being processed for the production of gas and coke must be reserved for such processing, that only those coals which are not so capable should be used raw for the generation of electricity and other purposes requiring steam in bulk, and that generally speaking raw coal should not be used at all for space heating.

The limits within which our Industry can serve the nation in the conservation of coal and in the raising of the standard of comfort and the health and well-being of its people are wide indeed if only our technicians are allowed a free hand in our own development and if the industries upon which we impinge, particularly architects and the building industry, will co-operate intelligently and willingly in the common cause.

GUILDS

THE history of Guilds, or "Gilds" as they were originally called, is part of the social history of the British people. In the Middle Ages the tendency towards association by men of similar interests was remarkably strong. Historians state (*e.g.*, Birnie, "Economic History of the British Isles") that this tendency was created by the need to take common action because the State was as yet weak. Men had to find some means of doing for themselves what the State was not able to do for them. To-day, the opposite may well be the case. The tendency towards association, resulting in the "closed shop" in extreme conditions, is forced upon many because the State is too strong. Of late years there has been an over-riding of the people by the State. Without compunction the modern State has dispossesed whole classes of its constituent population, the outstanding example being Russia. In Britain, nationalization measures are carried through by popular vote, those in possession being compensated by arbitrary arrangements in which they have not necessarily concurred. The need for guilds was never so pressing as it is to-day. The wage-earners have their trade unions sufficiently powerful from a voting point of view to make and unmake Governments. Those at the top can generally look after themselves, though they too are falling before the craze for denudation to a dead level of mediocrity. The middle classes alone are unorganized and, being unorganized, are easily squeezed. The example of the medical profession, successful because highy organized, will be freshly in mind as an outstanding example of sound organization by professional men.

The Guild of the Middle Ages was not of a kind to commend itself to the 20th century. It was frankly monopolistic in character, aiming to set up and maintain the closed shop. The Merchant Guilds aimed to secure for the resident merchants a monopoly of the town's trade. But, in addition, beyond the walls of his native town, the mediæval merchant relied chiefly on his guild to protect him against injustice and wrong. In that respect the medieval guild was analogous to the Guild of to-day. At the same time the Guild tried to foster a spirit of helpfulness and mutual goodwill among its own members.

Much of the spirit behind the older Guilds can be seen in modern technical and professional bodies. The Benevolent Fund of the Institution of Gas Engineers is in direct accord with the objectives of the Mediæval Guilds. The insistence that only those who have qualified by passing certain examinations or taken a certain course of training shall practise medicine is equally in line. The professional institution as we know it to-day, however, is largely concerned with the spread of technical knowledge, with education, and social functions, and does not attempt to combine the functions it normally fulfils with those of a Trade Union. One would not imagine the Institution of Gas Engineers, for example, laying down salaries and conditions of service or negotiating as between employer and employed. It is necessary, therefore, for there to be separate bodies to do this. It was for this purpose that the Gas Engineers' National Guild was set up. The report of this Guild printed on another page in this issue shows clearly the type of work upon which such a Guild can and should engage.

GAS ENGINEERS' NATIONAL GUILD

THERE have been many attempts to fix conditions of service and salaries in the Gas Industry. Our postbag bears eloquent testimony to the dissatisfaction that exists in many undertakings regarding the scale of salaries of the engineering and technical staff. Too often in municipalities this scale is fixed on the basis of the salary paid to the Town Clerk. There seems to be less dissatisfaction as regards company-owned undertakings, but even here one hears echoes of trouble, whispers of complaint. There must be some proper basis on which salaries should be computed. When disputes arise on conditions of service as between employer and employee there must also be some sound basis upon which such difficulties can be resolved. It is not a matter of "the gas engineer is right or wrong"; frequently a man feels himself aggrieved when there is no cause. Under these conditions a stable, strong, central body can be of immense help. It would be wrong to suppose that membership of a Guild necessarily means disputes between a man and his employers. On the contrary it is likely to smooth the path by providing a yardstick against which all complaints and sore feelings can be measured. A man's view of his worth may be too high or too low. The employer may be honestly trying to reconcile two differing views. It will be of immense help to have a central body, fully informed and responsible, to which such difficulties can be taken.

One of the difficulties, as is pointed out in a recent letter sent by the Gas Engineers' National Guild to its members, is that the minority cannot legislate for the majority. Put plainly it amounts to this: The employers, through the Federation of Gas Employers, have recognized the Guild by agreeing to appoint a committee to meet the members of the Guild deputed for that purpose to hammer out a fair salary scale. If the Guild does not comprise sufficient members of any particular grade, the employers cannot negotiate. That is a fundamental proposition of trade union rule, and must equally apply to the Guild. The Guild salary scale should satisfy most gas engineers, but it will not stand a hope of being accepted unless gas engineers generally become members of the Guild and show by their membership that they desire the Guild to negotiate for them.

The Guild report—see later pages—indicates that there are still a good many gas engineers eligible to join who are sitting on the fence unable to make up their minds, or unwilling to risk possible repercussions with their own undertakings. We do not think they should hesitate longer. This is the day of collective bargaining. Employers generally prefer to have an agreed scale that can be applied without fear or favour and the Ministries are likely to refuse to negotiate on any other basis. The colliery managers directly negotiated their conditions of service with the Minister before nationalization, for example. If nationalization comes it will throw everyone into the melting pot. The need for

every gas engineer to stand together to ensure that everyone shall have fair treatment is of the very greatest importance to every gas engineer in the country. Our advice would be that everyone eligible should join the Guild in his own interests and in those of the profession.

The need for a separate Guild for senior men, and perhaps for technical men generally, is evident and admitted. There are excellent Guilds looking after the clerical staffs and embracing most of the junior staffs and some seniors. These Guilds or associations have already done good work within their sphere. It is, however, necessary that the engineer and manager, for example, shall be on a different plane from his junior staff. The difficulty with technical men generally, so far as we are informed, is that they do not join any body. They are individualists, but the day of collective bargaining is here, much as we may dislike it.

In this respect we stand at the parting of the ways. Either the Gas Engineers' National Guild must attain something approaching to 100% membership, or the idea of carving out standard and reasonable conditions of service must be abandoned. We cannot imagine another attempt to form a "trade union" for gas engineers being made within should the Industry be nationalized. Union is still strength; and we may add that the electrical engineers have a strong body representative of Chief Engineers and another one for the remainder of the technical staff.

The Committee of the Guild has clearly been in some doubt as to who should be eligible for membership. Perhaps the use of the term "eligible" is unfortunate, for the Guild is in no way an organization of which membership infers professional competence. Membership must clearly depend upon whether the position a man holds is one that is covered by the Guild's activities, and nothing more. The scope of membership, therefore, in our view, involves the prior consideration of the field that is to be covered by the Guild. The Guild evidently considered in the beginning, and quite naturally so, that it could cover all corporate members of the Institution of Gas Engineers. Immediately there comes the difficulty that many holding the position of gas engineer, or of gas engineer and manager, are not members of the Institution. Admittedly, they should be; but the position as it exists must be considered to the exclusion of what the position would be in a perfect world. The Guild wisely decided, therefore, to widen the scope of membership to include all engineers and managers above the status of "working manager," and to include others who held professional qualifications. It may be inferred that even at this stage the true function of Guilds was not fully grasped, because the subsequent changes that have just been accepted by the majority of members voting in a ballot have narrowed this field slightly, to comprise virtually only the senior staff members of the industry. The way is open to accept others, but whether they should be accepted or not depends entirely on how complete is the membership of that particular grade.

To take a specific example, let us suppose that Deputy Distribution Superintendents wished to join. Should the Guild cater for men holding this position? The answer must be "Yes, if the majority of those holding that position so desire." If only a few join, it would be difficult in equity for the Guild to lay down salary scales to cover all who hold the position of deputy distribution superintendent. Yet until the opportunity is presented, how can it be determined whether that branch should be catered for or not? This rigidity makes for a possible weakness in the organization. It might be resolved by creating a second branch, a sink into which are thrown all members for whom the Guild cannot legislate or negotiate *as a body*, though it might do so *as individuals* for their specific circumstances. When sufficient numbers of that grade had joined, all those members comprising it could be transferred to the first grade of membership.

It will be clear from the analysis we have attempted to make that the Interim Committee that has guided the Guild thus far has had some difficult problems to tackle. In our opinion it has tackled them courageously and well; it has not been afraid to say that a mistake has been made and to make changes in order to effect improvements. The organization is now getting on to a sound foundation. What is needed is general support. The Gas Guild movement is strictly in line with modern social trends in which persons, whether employers, workmen, executives or professional men form themselves into associations of one form or another to afford mutual protection and support.

Personal

Mr. E. W. KING, who recently retired from the board of Robert Dempster & Sons, Ltd., of Elland, has joined the board of C. R. Averill, Ltd., of London, and will act for them generally in regard to sales to the Gas Industry in Great Britain and Ireland, and particularly as their representative for all sales in Wales and the South Western counties of England.

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Mr. Cyril G. Davis, on behalf of many friends, recently presented Mr. H. F. POTTER with a token of esteem in the shape of a silver salver, inscribed with numerous autographs, on the occasion of his completion of 50 years' service in the Gas Industry. Mr. Potter, who joined Glover & Main, Ltd., in 1897, has just been appointed an elective member of the Council of the Society of British Gas Industries.

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The marriage took place on May 22, at St. Andrew's Church, Cheltenham, of Captain John N. DUNCAN, M.N., of Edinburgh, and Miss ADELAIDE HELENA HALKETT, of "Pembury," Ivy Park Road, Sandygate, Sheffield. Miss Halkett is the only daughter of Mr. Ralph Halkett, Senr. (Director of the Sheffield and District Gas Company), and Mrs. Halkett, of "The Barns," Greet, Winchcombe, Glos. The Rev. J. Murray Rodger officiated, and the bride was given away by her father. Mr. Ralph Halkett, General Manager and Chief Engineer, the brother of the bride, was best man.

Obituary

A. J. MUMFORD

The death occurred on May 20 of Mr. A. J. MUMFORD, who retired recently on account of ill health from his seat on the Court of Directors of the British Gas Light Company and from his position as Secretary of the Company and its subsidiaries. He became Secretary in 1929 in succession to Mr. A. W. Brookes, whose nephew, Mr. F. T. Brooks, for many years Assistant Secretary, succeeded Mr. Mumford a few weeks ago.

Mr. **Henry Woodall,** Chairman of the Company, writes:

Mr. Mumford died after a long and painful illness borne with the greatest fortitude. He spent his whole working life with the Company, which he joined as a junior clerk in 1908. After service in the first World War his promotion was rapid, and in 1929 he became Secretary and chief official of the Company. For 18 years he guided its affairs and won the loyalty and respect of all with whom he came in contact. The British Gas Light Company is one of the oldest in the country—at one time it supplied gas in London. It now owns or controls 41 undertakings in different parts of England and Wales. Mr. Mumford's pride in his Company was very great, and he put before everything else his determination that nothing should impair its fair name and high reputation, and in this he succeeded. He will be greatly missed by everyone connected with the Company, and his name will long be held by them in the highest regard and affection.

Mr. Mumford was not a man to court publicity, so that his valuable work for our Industry was not so well known generally as that of others. His work on the Committee of the Gas Companies' Protection Association gave him a seat on the British Gas Council and there, as Chairman or a member of a number of important Committees, those in the position to know placed the highest value on his knowledge, sound judgment, and untiring effort. He had many friends on the various District Committees on which he sat, particularly in the Eastern District, where so many of his Company's undertakings are situated. From its formation as the Association of Holding Companies Mr. Mumford took an active interest in the affairs of the Association of Gas Corporations, and was a member of all its Committees, where his unparalleled knowledge of the problems of centralized control and management of gas undertakings was of the highest value. His death at the early age of 56 is not only a loss to the Company to which he devoted his life and gave untiringly of his energy and great abilities, but one which the Industry can ill afford at the present time. It can be truly said, however, that he has left behind an inspiring example, many friends, and no enemies.

Letters to the Editor

The Question of Encouragement

DEAR SIR,—Thank you for your most interesting editorial in your issue of April 9 on the subject of management and for publishing the resulting correspondence.

Every one of us in industry is interested in management—in a well-managed undertaking every employee benefits. Good management expresses itself in teamwork. Teamwork is the practice of democracy. The initiation and continuance of teamwork is the concern of us all. It demands the highest standard of honesty from each one of us, a determination that it shall work, a warm regard for the other man and appreciation of his best qualities.

The technician has a part in creating the atmosphere in which teamwork becomes a fact. He must look beyond the technical aspect of the job and consider foreman and operator as human beings. He can take time to explain and show his readiness to accept and to act on criticism and suggestions. We do need a new spirit in industry, and the amount of enthusiasm the technician has for his job, his vital interest in people, and his determination to work with manager, foreman, and men can mobilize the spirit of true democracy.

Yours faithfully,
M. J. SANDERS.

239, Ash Road, Aldershot.
May 20, 1947.

Moving Gasholders Erected for War Use

DEAR SIR,—It is easy to be wise after the event, but how advantageous it would have been had all the gasholders and tanks which were erected for war use, and many other vessels too, been built with bolts and nuts instead of rivets or with welded joints. So many of these are now worth very little because of the cost and difficulty of dismantling and of re-erection.

It may, of course, be said, and possibly wisely, that any disturbance from normal methods of construction and erection during the war would have delayed their installation.

Heaven forbid that we should have another war, but it would do no harm to hear what the contractors have to say about this.

Yours faithfully, G. M. GILL.

Severn Valley Gas Corporation, Ltd.,
Cheltenham,
May 19, 1947.

News in Brief

The Eastern Junior Gas Association has now been duly formed and the first Council elected by postal ballot. The first Annual Meeting will be held at the showrooms of the Peterborough Gas Company on June 11 at 2.15 p.m.

Vehicles of the Gas Light and Coke Company covered more than 5,000,000 miles in 1946. Some 495 drivers of the Transport Department entered for the Safety First Competition of the National Society for the Prevention of Accidents and 418 qualified for awards. Five drivers completed 20 consecutive years without an accident; nine with 15 years; 19 with 10 years; and 18 with five years.

Experiments in manufacturing coke from high-grade U.S. coal have begun at the works of the Wexford Gas Consumers Company. The coke aimed at is of the hard variety, and this necessitates changes in the ordinary process. If successful, the experiments may go a long way towards solving present foundry coke supply difficulties. The American coal being used is of very good quality, with a high calorific value, and its ash content is only 8%, compared with the 47% of recent supplies of British coal. Each ton of coal is expected to produce 10 cwt. of coke, and in addition 12 gall. of tar.

Reading Gas Company recently invited tenders for such an amount of 3¼% redeemable non-cumulative preference stock as would realize with premiums a total of £63,910, at a minimum price of issue of £100 per £100 stock. The issue was largely oversubscribed, the total amount applied for being over three times more than the stock available. Very satisfactory prices were realized. The proceeds of the issue are to be used to meet the cost of additional manufacturing plant and mains necessitated by the continued development of the undertaking, and for other capital expenditure which may arise.

When Dublin Gas Company Players chose "Mungo's Mansion," by Walter Macken, a well-known Abbey Theatre success, for production last week, they probably did not appreciate the irony of the situation in the second act, wherein it is desired to use a borrowed wireless set in a house fitted only with gas, and a flex has to be run to a next door neighbour who is blessed with electricity. Apart from this slight incongruity, and the continuance of the company's habit of using electric footlights, it must be admitted that the Players scored a great success. Production was by Humphrey Langan, of the Slot Collection Department, and the cast of nine included three newcomers to the Company. Proceeds were in aid of the St. Vincent de Paul Sunshine Fund.

Members of Airdrie Woman's Guilds heard an interesting talk on "Home Planning" by Miss Pidsley, of the Women's Gas Council. After describing appliances which would soon be on the market to help the housewife in her work, Miss Pidsley described the work done by the Women's Gas Council. She had had a talk with the various guild presidents and secretaries and they had decided to run a women's homecraft course at Airdrie in October, the speakers to be provided by the Women's Gas Council. Lectures would be given on such subjects as "Ironing," "Home Planning," &c. These lectures, Miss Pidsley said, would not be confined to guild members, but would be open to all women interested. Dean of Guild McIntyre presided and short addresses were given by the Rev. William Watson and Mrs. Bennie. Votes of thanks were proposed by Mr. G. E. H. Keillor, Engineer and Manager of the Airdrie Gas Department.

Campbeltown Town Council has protested against what it describes as "the disgraceful imposition of 66⅔% tax on the cost of new gas cookers," to the Chancellor of the Exchequer. The Council points out that the tax, instead of saving fuel, will encourage housewives to burn more coal. Bailie A. McKillip declared that it was disgraceful for any Government to impose such a tax and housewives in his opinion would be compelled to use coal for cooking purposes. The Housing Convenor supported the protest, indicating that it was going to affect every cooker fitted to new houses, and would be a serious imposition on the only available means of cooking in these houses.

Diary

May 29.—Yorkshire Gas Coke Association: Annual Luncheon, Great Northern Station Hotel, Leeds, 12.45 for 1 p.m.

May 30.—Women's Gas Council: Annual General Meeting, Gas Industry House, 3 p.m. Speakers: Lady Nunburnholme, Colonel H. C. Smith, M. Milne-Watson, J. R. W. Alexander, and Miss K. M. Halpin.

June 2-5.—Institution of Gas Engineers: 84th Annual General Meeting, Birmingham. (For full programme see "JOURNAL," April 30, page 235.)

June 9.—London and Counties Coke Association: Technical Committee, 2.30 p.m., Gas Industry House.

June 10.—National Federation of Gas Coke Associations: General Committee, Gas Industry House, 10 a.m.

June 10.—National Federation of Gas Coke Associations: National Technical Committee, 11.30 a.m., Gas Industry House.

June 10.—Solid Smokeless Fuels' Federation: Technical Committee, 2.45 p.m., Gas Industry House.

June 10.—British Gas Council: Central Board, 2.30 p.m., Gas Industry House.

June 11.—Yorkshire Junior Gas Association: President's Day, York. Inspection of works, 11 a.m. Afternoon visit.

June 11.—Eastern Junior Gas Association: First Annual General Meeting, Peterborough Gas Company's Showrooms, 2.15 p.m.

June 11.—National Benzole Association: Annual General Meeting, Wellington House, Buckingham Gate, S.W.1, 3.45 p.m.

June 12.—Midland Counties Coke Association: Central Committee, 2.30 p.m., King Edward House, Birmingham.

June 12.—Lancashire and District Coke Association: Annual Meeting and Luncheon, Grand Hotel, Manchester.

June 13.—Federation of Gas Employers: Annual General Meeting of Members in Scotland. North British Station Hotel, Edinburgh, 2.30 p.m.

June 14.—London and Southern District Junior Gas Association: President's Day; Summer Visit to Portsmouth.

June 14.—Manchester and District Junior Gas Association: Ladies' Day. Morning visit to the works of General Gas Appliances, Ltd., Audenshaw; afternoon visit to Buxton.

June 20.—Manchester District Association of Gas Engineers: President's Day; Visit to Blackpool.

Manchester District Association

THE Annual General Meeting of the Manchester District Association of Gas Engineers was held in the Midland Hotel, Manchester, on May 9, Mr. G. E. Currier, M.B.E., M.Inst.MechE. (Bradford), presiding.

The meeting was preceded by a Luncheon; about 100 members and guests attended the proceedings.

The **President,** on behalf of the Association, extended a hearty welcome, in the first instance, to Sir Ernest Smith, saying they all hoped that whatever work Sir Ernest Smith would be engaged upon in the future, whether it be on behalf of the Gas Industry or in some other way, he would be spared for many years to come in order to fulfil it. The President extended a special welcome to Alderman L. Newsome, J.P., Deputy Chairman of the Blackpool Corporation Gas Committee, who was attending the meeting in order to witness the induction of Mr. T. R. Cook, Engineer and Manager of the Blackpool Gas Undertaking, as the President during the ensuing session of 1947/1948.

Sir **Ernest Smith, C.B.E.,** proposed the toast of "The Manchester District Association of Gas Engineers." He very much appreciated the kindly remarks which had been made concerning himself, particularly as they came from the Manchester centre in which he had experienced his earliest associations in connexion with the Gas Industry. It was a matter of personal regret that Alderman Sir Frederick West had been unable to be present at the gathering because he had hoped to be able to congratulate him publicly upon receiving the Birmingham Medal of the Institute. It was an honour which was long overdue, but they would all be happy now he had actually received it. A year or so ago the Institution was good enough to make an exceptional presentation of the Medal to himself, but the Institution were short of a medal. The gold was not procurable because the Government would not permit the use of such a valuable metal for such a purpose. Sir Frederick West, however, came to the rescue, and handed his father's medal to the Institution so that it could be reinscribed and duly presented to himself. It was one of the most friendly things one man could do to another in the circumstances.

Fuel Restrictions

Continuing, Sir Ernest said it was now both the time and the occasion when the Gas Industry could pat itself on the back and feel proud of the way it had contrived to steer its way through the crises which had occurred during the war period and subsequent years. Regarding fuel rationing, if the Gas Industry had been told in a simple way that they had been supplied with 100% of their requirements in one year and they must be content with only 95% in the next, then it would have been the easiest thing in the world for every gas engineer in the country to devise methods to cope with the situation. There would not have been any need for quizzing or snooping and the country could have saved a corresponding amount of coal. Holders could have been filled and pressures maintained at different times and in different ways. One engineer would use water gas to a greater extent than another engineer, one could manufacture producer gas temporarily in association with coal gas, and so on. There were infinite numbers of ways in which such matters could have been arranged without standardization upon an electrical method solely to save the face of the electrical industry. This was a point which required to be stressed.

Another point which required consideration was what was going to happen if and when there was nationalization, with regard to technical development and research work? To-day, there were approximately 1,000 undertakings of which quite a large number were doing development and experimental work. At the present time when any engineer or technician had finished a piece of work he presented a statement of the results to the members of both the senior and the junior associations for discussion, after receiving permission from his superior to do so. What would happen when all technical work was under the control of someone at headquarters in the regions? Would such an engineer or technician be permitted openly to criticize or discuss the technical policies? He might be if there was a right kind of organization and if there was a similar degree of freedom to that enjoyed nowadays. It was to be hoped that if any senior member of the Gas Industry was to be placed in charge of its affairs that before he assumed any position on the Coal Board or the Gas Board he would not undertake the responsibility until certain fundamentals were agreed to beforehand. The Industry must carry on its own affairs, and it was not necessary, and never would be, to bring any technicians to issue orders to their fellow technicians of the Gas Industry.

They had every reason to be proud of the way in which the Association had laboured for the development and improvement of the technique of the Industry, and the Institution of Gas Engineers stood head and shoulders above any other body in contributing to its success over a very long period of years.

They were all anxious that the present position should be maintained and also improved as a service to the nation, quite independently of who supplied the necessary finance. Gas engineers and scientists were the people who kept the Industry in being, but they needed to be a little more active than they had been in the past. There should be a little more prompting through the Press with regard to requirements for the future. Should it be found that owing to political changes or for any other reason the nationalization of the Gas Industry was deferred for a time, it was necessary they should all concentrate on the common purpose and evolve their own method of integration. If they did not, then they would miss the boat; because things were not right in the Industry. Integration and co-ordination were vitally required.

In connexion with the toast, they could not overlook the fact that the outgoing President was Mr. George E. Currier, one of the most active principals within the Industry, which owed him so much. His latest venture, the Gas Engineers' National Guild, was one which should receive the support of every technical man concerned with gas affairs. Personally he was 100% believer in the Guild. The technical men must get together in order to protect themselves and conserve their activities. The usefulness of their efforts must not be weakened or dissipated as a result of their attention being directed to matters with which they had little or no concern. He was bringing it forward entirely on his own initiative, and Mr. Currier had not known of his intention to discuss it.

Enhanced Prestige

The **President,** responding, wished to thank Sir Ernest Smith for all the kind things he had said concerning the Association, and which all the members of the Association humbly hoped were fully deserved. He fully appreciated the reference to the Gas Engineers' Guild. When he took up the position of its Chairman he stated quite clearly it could only be for a period of twelve months. The Guild had not altogether received the support expected, and he wished to say something more about it on another occasion.

Apropos the fuel crisis, in his opinion not sufficient credit had been paid to the Gas Industry for the work they had accomplished. Owing to the adoption of various expedients throughout the country hundreds of thousands of tons of coal had been saved, though many of such expedients would never have been countenanced by gas engineers in years gone by. However, the net result had been that the Industry had emerged from the crisis with enhanced prestige. It was practically a truism to state that there had been no failure in regard to the supply of gas. There might have been reduced pressure, but there were very few, if any, cases of actual failure. It was amusing to hear some of their electrical friends bemoaning the fact that during the fuel crisis Mrs. Brown with her gas cooker could carry on with the preparation of the dinner while Mrs. Jones with her electrical cooker was unable to do so. They were saying that it was not fair, and that the Ministry of Fuel and Power ought to place some restriction upon the Gas Industry. Of course, this was an absurd attitude to take up. It could be recalled that last year the electricity industry put out a million one-kilowatt fires which were sold in radio and ironmongers' shops throughout the country. One million one-kilowatt fires involved an additional peak load equivalent to 10 generating stations such as there were at Bradford, which did happen to be a selected station, but there was no complaint from the electricity industry then.

Business Proceedings

It was explained that the following letter had been received from the Lancashire District Gas Education Committee (Institution of Gas Engineers) and had been circulated among the members of the Association:

LANCASHIRE DISTRICT GAS EDUCATION COMMITTEE.
(Institution of Gas Engineers.)

Mar. 29, 1947.

T. Haworth, Esq.,
Hon. Secretary,
Manchester District Association of Gas Engineers.

Dear Mr. Haworth,

At the meeting of this Committee, held on Mar. 25, the lack of success of students from this area in the examinations of the Institution was discussed.

The Committee fully shares the disquiet of the Senior Association. It was felt that the present arrangements at the Manchester College of Technology are not satisfactory and we are seeking some way out of the difficulties. These difficulties would largely be met if we could find suitable lecturers to deal with the Gas Engineering (as distinct from the Chemistry of Gas Manufacture). Could your Association help up in this matter?

I understand that the Senior Association has already expressed agreement in principle with the idea of part-time Day Courses, and this Committee heartily concurs. We feel that the possibility

should now be actively explored; and we would ask for the support of the Senior Association in the matter.

Would the Seniors be prepared to give facilities for students to attend suitable centres either at the Manchester College of Technology or elsewhere, or, say, one day per week? Also, would facilities be granted for suitable members of staffs to give the necessary lectures—also, of course, during the day?

There is at present the very greatest difficulty in finding suitable lecturers for evening classes, but it is hoped that they might be forthcoming for day classes. Meantime, we are trying to find some solution to the present difficulties in the hope that the next Session at the Manchester College of Technology may be more successful.

Any assistance that your Association could give would be very greatly appreciated.

Yours faithfully,
H. C. APPLEBEE,
Hon. Secretary.

Mr. **J. C. Hogg** (Stretford) thought the members of the Association were well aware that the situation with regard to the educational arrangements at local colleges was not all that it might be. In the first place there was a considerable number of students to be provided for as well as a lack of suitable lecturers. The Education Committee had considered the problem in conjunction with H.M. Examining Inspector of Schools, and it was felt that some adjustment of the position should be made for the next Session. Part-time day classes should be instituted as soon as possible and lecturers provided for engineering subjects. At the moment the chemical side was being over-stressed. The Manchester and District Junior Gas Association looked to the Senior Association for assistance in the directions indicated.

Mr. **F. G. Shaw** (Buxton) also emphasized the importance of adopting part-time day courses for students of technical subjects. It was necessary to increase the number of lecturers.

The **President** was quite sure that every chief of an undertaking present at the meeting would support such an application and do all he could to provide the necessary lecturers as well as enlist the sympathy of his respective Board or Committee. He would propose from the chair, that that support be given accordingly.

Mr. **T. R. Cook** (Blackpool) seconded the motion.

Mr. **C. H. Bamber** (Rochdale) said there was no question about according the necessary support, but all engineers would require to have some concrete proposals upon which to base their reports.

Mr. **F. G. Shaw** said he would be pleased to forward a suitable letter to that effect to every member of the Association.

The motion was carried unanimously.

Mr. **N. Hudson** (Mirfield) said that similar steps should be taken in Yorkshire.

Obituary

The **President** made sympathetic reference to the death of two members of the Association: Mr. Owen Evans (Wrexham), member since September, 1913; Mr. M. T. Thompson, Drakes, Ltd., Halifax, who rose to the position of Managing Director of a firm which has contributed much to the Gas Industry.

New Members

The following were formally inducted as members of the Association:

Messrs. C. F. Davies (Simon Carves, Ltd.), S. S. Francis (Woodall Duckham Company), H. B. J. Hart (Engineer and Manager, Shipley Gas Department), A. Smalley (Engineer and Manager, Marsden Gas Department), and H. Spencer (Engineer and Manager, Barnoldswick Gas Department.

The Report of the Lancashire Commercial Section was presented by Mr. **R. L. Greaves** (St. Helens), who moved its adoption. Mr. **H. H. Knowles** (Buxton) seconded, and it was unanimously approved.

The **President,** as Chairman of the Yorkshire Section, presented the Report of the Yorkshire Commercial Section, and moved its adoption. Mr. **F. C. Brockway** (Cleethorpes) seconded. and the Report was unanimously approved.

The **President,** as District Member of the Council of the Institution of Gas Engineers, then gave a brief report of the work of the Institution during the past year, which was approved and accepted.

Honorary Member

The meeting then elected to Honorary Membership Mr. J. Winson Scott (R. J. Dempster, Ltd.).

Mr. Scott was unable to attend the meeting. The election was moved by Mr. **A. L. Holton** (Altrincham) and seconded by Mr. **T. Reynolds** (Stockport), and carried unanimously by acclamation.

Mr. **A. L. Jennings** (Spenborough) proposed and Mr. **J. Hood** (Blackpool) seconded that a donation of 50 guineas be granted to the Benevolent Fund of the Institution of Gas Engineers.

The motion was carried unanimously.

The **President** moved that Mr. T. R. Cook (Blackpool) be appointed the Association's district Member of the Council of the Institution of Gas Engineers for the year 1947/1948.

The motion was seconded by Mr. **N. Hudson** (Mirfield) and carried unanimously.

The following items were then considered, and on the motion of Mr. **C. S. Shapley** (Leeds), seconded by Mr. **F. Beaumont** (Meltham), were unanimously approved and adopted:

That Messrs. R. Walker (Manchester) and N. Hudson (Mirfield) be appointed representatives of the Association on the Councils of the Manchester and District and Yorkshire Junior Gas Associations respectively.

That Messrs. F. G. Shaw, R. Walker, A. H. Nicholson, and J. H. Clegg be appointed representatives of the Association on the Lancashire District Gas Education Committee.

That Messrs. J. M. McLusky, D. T. Livesey, J. G. Tilley, and N. G. Appleyard be appointed representatives of the Association on the Yorkshire District Gas Education Committee.

That Messrs. L. W. Harrison and R. N. Webb be appointed representatives of the Association on the Barnsley Advisory Committee of Coke Oven and Chemical Works.

That the following appointments be made to the National Smoke Abatement Society: North-Western Divisional Council, Mr. C. H. Bamber; North-Eastern Divisional Council: Mr. Geo. E. Currier, M.B.E.

Induction of President-Elect

The **President** formally invested Mr. T. R. Cook with the Presidential Badge and inducted him into the Chair as President of the Association. In doing so, the retiring President said that nothing could give him greater pleasure than to find Mr. Cook succeeding him.

Mr. **Cook** said he wished to thank in particular his friends Mr. T. Reynolds, Mr. N. Hudson, Mr. C. H. Bamber, and Mr. George Currier, for submitting his name for election to the Committee in past years, and subsequently as President of the Association for the coming year. He was thankful to all the members of the Association for supporting his election to the highest office it was within the powers of the Association to bestow upon any member.

The **President** then presented Mr. Currier with the Past-President's badge, and expressed the hope that it would be the medium of conjuring up pleasant memories of his very successful year of office in the Presidential Chair.

A telegram of congratulation to Mr. Cook was received from the President and members of the Manchester and District Junior Gas Association conveying their best wishes for a successful year of office.

Invitation to Blackpool

Alderman **L. Newsome** (Deputy-Chairman, Blackpool Corporation Gas Committee) expressed the appreciation of his Committee of the high honour which had been paid to their Engineer, for whose services they had so much value. Blackpool now claimed to have one of the finest gas-works in the country—namely, Marton—which the members of the Association would be able to inspect if they would accept the invitation of the Mayor and Corporation to pay a visit to the town and inspect its many attractions during the month of June.

On behalf of the Association and himself the **President** accepted the invitation.

Presidential Address

Mr. Cook then gave his Presidential Address. This was published in the "JOURNAL" of May 14.

Mr. **N. Appleyard** (Leeds) moved that a hearty vote of thanks be accorded to Mr. Cook for his extremely interesting and instructive survey of the progress of the Blackpool undertaking. The fact that there was an increasing encouragement of the use of oil fuel must not be overlooked, while the provision of equipment and storage accommodation generally appeared to be a bottle-neck which drastically influenced expanding gas sales. The remarks in respect of the Gas Engineers' Guild were fully warranted, and it was to be hoped that a high percentage of membership would be attained at an early date. The provision of coals most suitable for carbonization was also a matter for full consideration.

Mr. **C. H. Bamber** (Rochdale), seconding the vote, noted Mr. Cook's recommendation of the changing conditions occurring in the Industry with regard to methods of gas manufacture. The cost of carbonizing plant was nowadays rocketing sky high and was bringing to the forefront the production of carburetted water gas and other methods of gas manufacture as a means of reducing over-all costs. He had visited the new works at Marton and had obtained valuable information from them of which he had been able to make use in the reconstruction of the Rochdale works.

The **President** responded.

Mr. **W. S. Hubbard** (Liverpool) proposed a vote of thanks to the retiring President and the two retiring members of the Committee (Messrs. W. A. Dearden and Mr. F. A. West), and other officers for carrying out the work of the Association during the past year; to the Honorary Secretary (Mr. Thomas Haworth), all of whom he heartily congratulated on the success with which they had fulfilled their special duties.

Mr. **J. Fletcher** (Preston) seconded and Mr. **Currier** responded.

Wales and Monmouthshire Association of Gas Engineers and Managers

THE 42nd Annual Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers was held at the South Wales Institute of Engineers, Cardiff, on May 21, under the Presidency of Mr. E. M. Edwards, Engineer and Manager of the Port Talbot Gas Department. The programme included the official luncheon, to which ladies were invited, a visit to the Grangetown Works of the Cardiff Gas Light and Coke Company, and a day's golf on the following day on the Glamorgan Golf Course, Penarth.

The **President,** in opening the meeting, welcomed Councillor E. J. Morris (Mayor of Port Talbot), Alderman H. Griffiths (Chairman of the Port Talbot Gas Committee), Mr. R. H. Williams (Chairman of the Cardiff Gas Light and Coke Company), Mr. W. Thomas (of the Welsh Board of Health), and Mr. J. Morris (Principal Housing Officer for Wales of the Welsh Board of Health). He also reported apologies for absence from Mr. G. C. Pearson (President of the Institution of Gas Engineers), Mr. J. R. W. Alexander (General Manager of the British Gas Council), Professor Jones (University College of South Wales and Monmouthshire), Dr. A. B. Badger (Federation of Gas Employers), and Presidents and Secretaries of kindred Associations.

He also made sympathetic reference to the death since the last meeting of Mr. J. Sadler (Social Secretary), Mr. Owen Evans (Wrexham), Mr. Owen Jones (Holyhead), and Mr. F. W. Grimsley (St. Asaph).

The following new Member and Associates were then unanimously elected and the President extended to them a cordial welcome into the Association:

Member: J. A. Anderson (Neath). *Associates*: E. Aspinall (Halifax), V. R. Baldwin (Reading), M. J. Brown (Bristol), H. Castleton (Builth Wells), G. Ewart (London), R. A. Gittens (Mold), D. G. Jones (Aberystwyth), R. B. Reynolds (Cheadle Hulme), A. O. Russell (Warrington), G. A. Vernon (Bilston), L. Van de Velde (London), W. Savage (Blaina), J. Brook (Connahs Quay), H. Short (Porthcawl), and J. F. Lloyd (Wrexham).

Memorial Funds

The **Hon. Secretary** (Mr. Darrell W. Rees) presented a statement on the present financial position of the Octavius Thomas Memorial Fund, which was formally adopted.

The **President** said the Council had been considering the Fund and during the current year they hoped to bring before the Association suggestions for implementing the intentions of the Fund which was created several years ago to perpetuate the memory of one who was deeply loved by them all. At that time a large proportion of the money was paid to the Institution of Gas Engineers Benevolent Fund and the balance was retained by the Association on the understanding that the Fund was to be applied each year to some special form of recognition of the best student of the year in the Wales and Monmouthshire area. The Council hoped to be able to arrange for that to be done this year.

The **Secretary** then presented a report on the H. D. Madden Memorial Fund.

The **President** said that in this case the original intention was to perpetuate the memory of Mr. H. D. Madden by the provision of a presidential badge, and the Secretary was now obtaining designs for the proposed badge.

The **Secretary** presented the annual report and accounts and said the membership of the Association was now 206, comprising 107 Members, 93 Associates, five Honorary Members and one Student Member, showing an increase of 12 over last year. The Council, he said, proposed to give careful consideration this year to the importance of stimulating interest in educational schemes for all personnel engaged in the Gas Industry, and to the need for closer co-ordination in the activities of the District and kindred Associations. Owing to the fact that the Association was contemplating a revision of the rules, the cards of membership and rules which it was arranged last year should be printed had not yet been issued.

Proposed Revision of Rules

The **President** said the Council had given considerable thought to the rules of the Association and felt that some revision was necessary in order to bring them more into line with those of other District Associations throughout the country.

The **Secretary** explained the proposed revisions regarding qualification for the various classes of membership. So far as Members, Honorary Members, and Student Members were concerned there were only minor changes, but in the case of Associates it was proposed that "Associate Members shall be persons not under 24 years of age and qualified to assist in promoting the objects of the Association by reason of their professional knowledge or experience and who shall not be engaged with any trading or manufacturing firm, except where such applicants for Associateship have already been accepted as Members or Associate Members of the Institution of Gas Engineers." (The existing rule was that "Associates shall be persons not under 21 years of age who, having sufficient professional knowledge or experience, are considered by the Council qualified to assist in promoting the objects of the Association.") The new proposals defined Student Members as "persons not under 18 and not over 24 years of age and studying for the recognized examinations of the Institution of Gas Engineers or university degree, and employed by a company or local authority gas undertaking. (The present rule defined Students as "pupils under the training of engineers of gas-works in the service of gas companies or local authorities.") The Council's recommendation was that the revisions should not be applied to any existing member in any of the different classes.

Mr. **A. Pickard** (Llanelly) suggested that in the case of students whose training had been interrupted by war service the Council should be given discretion in waiving the proposed upper age limit, and this was generally agreed to.

Mr. **S. H. Lawrence** (Ellesmere Port) said he was all in favour of raising the technical status of the Association, but he was rather concerned about the Associates—those to whom they generally referred as the trading members. The Association had received a great deal of support from the Associates in the past, and many of them were technically qualified to a high degree in their own particular spheres of activity. He had particularly in mind the late Mr. J. Sadler, than whom no-one had done more for the Association, with no hope of reward save the joy of communicating happiness. If they were going to exclude such men in the future they would have to do all the work themselves, and there would be no point in the existing Associates remaining in the Association if there were to be no more of them admitted in the future. He was prepared to move an amendment to the effect that the existing rule regarding Associates should be retained.

The **President** assured the meeting that there was no "motive" behind the proposals other than that of bringing the Association into line with other Associations in the light of advancements in technical education. While it was open to Mr. Lawrence to propose an amendment he felt it would be unfortunate to pass three of the four clauses submitted to the meeting and leave one class of membership without any clearly defined rule.

Mr. **W. Moreland Fox** pointed out that there were three classes of membership of the Institution of Gas Engineers, namely, Members, Associate Members, and Associates. Associateship of the Institution covered those engaged in trading and also covered members of the Industry who, due to their training, had not always attained the technical qualifications necessary for full Membership. His own technical assistant had come out of the Industry and joined his Company as chemist. When his name went forward for Associate Membership of the Institution it was deemed that his qualifications were not sufficient for that grade and he was therefore accorded Associateship. He therefore suggested that the last line of the proposed rule should be amended to read "Members, Associate Members, or Associates of the Institution of Gas Engineers."

Mr. **W. Clark Jackson** (Neath) said they had had many very able men in the Association as Associates, experts in their own field, but not qualified under the rule for Membership—men with whom they had to discuss technical matters in the ordinary course of their trading. He felt the Council should review the matter in the light of the suggestions now made.

The **President** said they were deeply concerned in the welfare of the Association, and it was clear to him that if the matter went to a vote there would be a division of opinion. With the approval of the mover and seconder of the revisions, therefore, he proposed to allow the matter to be deferred until the next meeting. Meanwhile he asked that all who had any amendments to propose or suggestions to make should submit them to the Secretary in writing as soon as possible so that the Council would be enabled to reach a solution acceptable to the Association as a whole.

Mr. F. Dupont becomes President

The **President** said it gave him special pleasure to propose the election of Mr. F. Dupont (Brecon) as President for the coming year, to take office from the September meeting. They were boys together at Neath and he had known Mr. Dupont ever since he entered the Gas Industry. He was an exceedingly competent and able engineer.

Mr. **W. Clark Jackson** seconded and said that if members ever had the opportunity of visiting Brecon and seeing the model gas-works there they would come away more aware than they were to-day of Mr. Dupont's qualifications as an engineer. He had made a first class job of his work, and on behalf of the Directors of the Brecon undertaking he (Mr. Clark Jackson)

could assure them that if it was their desire to visit Brecon during Mr. Dupont's Presidency they would offer them the sincerest and best of hospitality.

Mr. **Dupont** briefly returned thanks and said he would do his best to further the interests of the Association.

On the recommendation of the Council the following elections were unanimously confirmed:

Senior Vice-President, Darrell W. Rees (Pembroke); *Junior Vice-President,* H. Blythe (Colwyn Bay); *Members of Council,* K. E. Tiddy (Carmarthen) and H. Maycock (Holywell); *Treasurer,* J. H. Canning (Newport); *Secretary,* Darrell W. Rees; *Secretary of North Wales Section,* H. Blythe; *Auditors,* A. D. *Howells* (Abergavenny) and W. F. Edwards (Bridgend).

The **President,** referring to the re-election of **Mr. Darrell Rees** as Secretary, expressed his gratitude to him for the hard work he had done during the year, and especially for the work involved in arranging the present meeting. At the President's suggestion a message of good wishes for improved health was sent to Mr. J. H. Canning.

On the proposition of Mr. **W. Moreland Fox,** seconded by Mr. **E. W. King,** the meeting agreed to make a grant of 15 guineas to the Benevolent Fund of the Institution of Gas Engineers.

Mr. O. P. **Cronshaw** (Rhyl) was unanimously re-elected as District Member of the Council of the Institution.

The **President** presented Mr. A. H. Dyer (Newport) with his Certificate for passing the Higher Grade Certificate in Gas Engineering (Supply).

Mr. R. J. Auckland offered congratulations to Mr. Dyer on having accomplished this stage of his ambition as the result of studies under great stress during the war years and in his own spare time. The Directors of the Newport Gas Company would be very happy to congratulate him on his achievement.

An Outstanding Address

The President then delivered his Presidential Address (see page 445).

Mr. **W. Clark Jackson,** proposing a vote of thanks to Mr. Edwards, recalled how he came to him at Neath as a boy, proceeded to Holyhead and its associated undertakings, then went south, and eventually returned to South Wales as Engineer and Manager at Port Talbot. He had been in grave doubt as to whether to take the appointment, but his decision had proved to be of substantial benefit to Port Talbot in particular, and to South Wales in general. In his Address he had outlined the policy he had recommended his Corporation to follow in respect of its gas undertaking, and as the figures showed that policy was laid on very sound foundations and had achieved remarkable results. Even allowing for the large portion of gas delivered in an unpurified condition to one of the works at Port Talbot, the remarkable increase in domestic consumption during the time he had been there reflected the greatest credit on him and on the soundness of his policy. He had also served the Association well, and he recalled the great impression he made when he read a Paper some years ago which the late Mr. Madden referred to as a masterly address. He had served South Wales well and so far as the gas undertakings in West Wales were concerned he was at present acting as convener of the Western Working Party, thus adding to the debt which Wales owed to him. He had also served the gas undertakings of South Wales as Hon. Secretary of the South Wales Committee of the Federation of Gas Employers and had discharged a most arduous duty in the last few years in dealing with labour problems.

In his contacts with the undertakings and their engineers, and his contacts in London with the British Gas Council and with the headquarters of the Ministry of Fuel and Power, Mr. Edwards had been given a great deal of appreciation and confidence. The work he had devoted to the Working Party was enormous. Interesting as were the figures given in his Address, he believed they would be even more appreciated when members had the opportunity of sitting and reading them at leisure.

Mr. **O. P. Cronshaw** (Rhyl), Immediate Past-President, in seconding the vote of thanks, said that since the gas engineers in North Wales had come into closer union with the Association, Mr. Edwards had been one of the men with whom they had had the greatest contact, and they had admired his great capacity for work. It seemed there was never a job he could not tackle, and do well. As Secretary of the Federation of Gas Employers in North Wales he knew something of what Mr. Edwards had done in a similar capacity in the south.

The **President** briefly acknowledged the vote of thanks, and said that, if anything, he had done for the Association had repaid in any way the debt he owed to the Association, going back over many years to the days of Octavius Thomas and H. D. Madden, he was more than grateful. As usual, the question of the date and place of the next meeting was left in the hands of the Council.

The Luncheon

Members and guests were joined by their ladies for the luncheon at the Park Hotel, which was graced by the presence of the Lord Mayor of Cardiff (Alderman G. J. Ferguson) and the Lady Mayoress.

Councillor **E. J. Morris** (Mayor of Port Talbot) proposed the toast of "Cardiff, Its Prosperity and Future."

The **Lord Mayor,** responding, said the Gas Industry had done a great job of work during the war. They had kept their end up throughout the country, and there had been little or no complaint, although, being in the coal trade, he knew they were not getting coal of the same quality that they used to get years ago. As their President had remarked, they must put up with it and not grumble. That was a very nice spirit and so long as they kept it he was sure they would continue to succeed. As this year's chief citizen he was proud of Cardiff, and he claimed that its civic centre was among the best in the country. From the industrial standpoint Cardiff was looking forward to a long period of prosperity as a great industrial centre. Developments were taking place in that direction and they looked forward to a greater Cardiff in the future. They had a great programme for factory building, and over five million pounds was to be spent. The superficial area of the new factory space would exceed 1,500,000 sq.ft. They hoped that within three years those factories would be working.

Closely linked with that development was the housing problem, and in that connexion he was pleased to say that Cardiff was completing from 20 to 30 houses per week ready for people to live in. They had, however, from 13,000 to 15,000 people waiting for houses, so they still had a great problem to face.

Mr. **R. J. Auckland** (Director and Manager, Cardiff Gas Light and Coke Company) proposed the toast of the Association, which he described as primarily a professional body concerned with the future of the Gas Industry, particularly in regard to the training of its personnel and the carrying on of its technical work. During the war it had carried on under the most difficult circumstances an Industry which was essentially a difficult one, assailed as it was by an enemy trying to wipe out its usefulness as a public utility and service. That the Industry had succeeded in carrying on so well was in his view a tribute to the skill and competence of the gas engineer. In coupling with the toast the name of the President, he said that for some time Mr. Edwards was responsible for a group of small undertakings, and he had told him of some of the difficulties he had had to contend with. The resource, ingenuity, and inventiveness which those responsibilities entailed had, he was sure, done much to fit him for the responsibilities of the larger undertaking of which he was now Engineer and Manager. Mr. Edwards had an extraordinary capacity for work, and he had displayed exceptional diplomacy, tact, courtesy, and judgment in all matters connected with the Industry.

The **President,** replying to the toast, said that whatever the future might hold, the Association would always remember the great and invaluable help it had always received from the Cardiff Gas Light and Coke Company, and especially from the late Mr. Madden, Mr. Williams (Chairman of the Company), whom he was glad to welcome among the guests, Mr. Auckland, and Mr. Boardman. The Company had done more than many members realized, and they were that day to be the guests of the Company as visitors to the Grangetown works. The Association had a record of 42 years of useful service, and he believed that future years would afford greater opportunities for that service to the community which the Gas Industry as such had always been proud to provide. The present coal shortage emphasized the necessity for using such coal as was available in the most sensible manner. In the rehousing programme they sought to provide the housewife with better facilities.

What was the future of South Wales to be? Was it to go back to the dreary conditions that existed in certain years in the past, or were they to look forward and go ahead to a long period of continuous work and development? The future of the Gas Industry was tied up with the new factories going up in the area. The demands for gas were increasing very rapidly, and industrialists were appreciating more and more the advantages of gas as a refined fuel. The demand was tending in some instances to overtax the productive capacity of the works, but that matter was being dealt with. Some aspects of gas grid development had been referred to at their meeting that day, and moves were now on foot to co-ordinate gas supplies throughout the area. Such a development would have the effect of providing ample quantities of gas both for industrial users and domestic consumers at reasonable prices. He was not unmindful of the fact that the Association represented North Wales as well as South. The North had its own particular problems and he was confident they would overcome them. He was grateful for the support he had received that day from the Mayor of Port Talbot and the Chairman of his Committee; it was typical, he said, of the support he had received consistently throughout the 15 years he had served the Port Talbot undertaking.

After lunch, a large number of members inspected the Grangetown works of the Cardiff Gas Light and Coke Company, special interest being taken in the new water gas plant nearing completion. The visitors were afterwards entertained to tea, where thanks were expressed by the President and acknowledged by Mr. F. Boardman.

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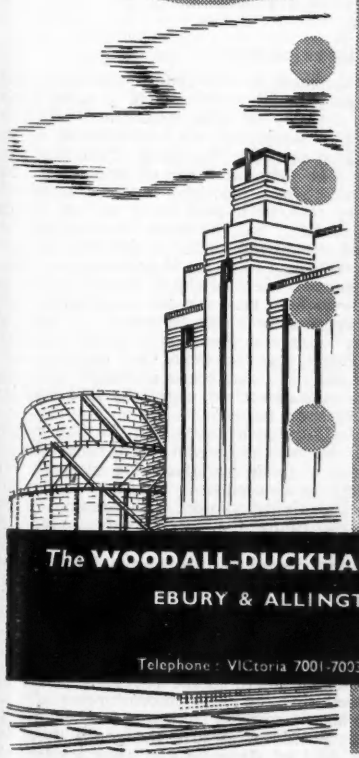

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Thirty Years' Progress by Evolution*

By HAROLD HARTLEY, D.Sc.
President-Elect, Institution of Gas Engineers

BEFORE the first world war a number of the gas appliance makers were carrying out development work very energetically. In that period also a background of knowledge was being built in regard to the assessment of the performance of apparatus and one was concerned very much not only with devising means of determining efficiencies, but also in trying to understand the conditions which needed satisfying by the heating, cooking or hot water supplying apparatus.

Efficiency figures in those days were always computed on the basis of the net c.v. of the gas, as the therm had not then been introduced. Thirty years ago there existed in the Industry a mistaken belief that it was not a good thing to supply convected heat to a living room. Many of you will remember the gibes that were made about "hothouse conditions." This mistaken belief had been strengthened as a result of the faulty performance of early types of gas fire—there was no agreed hygienic standard in those days. It was not until 1912 that W. R. Twigg introduced his shadowgraph test and proposed that gas fires should be so designed that all products of combustion passed through the flue outlet, even when unaided by chimney pull. A modified form of the shadowgraph test, in which a heavy sheet of copper, nickel-plated, is held against the canopy of the fire after suitable cooling, provides a very simple means of detecting the escape of products of combustion. The hygienic standard of design was of such obvious importance that the *Lancet*, when agreeing the general recommendation made by Twigg, proposed an alternative test based on the use of carbon tetrachloride and ammonia, with which you are all familiar.

Change in Public Attitude

Since the early years of the century there has been a notable change in the attitude of the general public towards the gas fire, and there are few to-day who would suggest that it was an undesirable appliance, although there are still some who say they prefer the open coal fire.

Some years ago it was strongly contended that the radiant energy from the gas fire scorched the exposed skin of the body, and that such effects were not produced by the solid fuel fire. It is possible that this criticism had some basis of fact, not necessarily associated with the mode of distribution of the heat. Anyhow, investigations showed that if the proportion of short infra-red energy available were increased in the heat emitted by the fire, a sensation of greater comfort resulted. The shorter infra-red energy penetrates the skin and stimulates the capillary blood flow; it may also be more readily reflected by the skin. The work which we did some years ago might be extended with advantage.

In the last 20 years appliance makers of repute have designed their appliances not merely to satisfy efficiency standards, but also to conform to a high hygienic standard.

The cooker oven has been modified in detail and to-day gives a very much improved cooking result compared with those attained after the first world war. In those days there were no agreed cooking tests, and I well remember in connexion with the deliberations of the Gas Investigation Committee of the Institution, a lot of trouble was taken in carrying out maintenance tests, heating up tests and the like, but the recommendation that a bread baking test be included in the schedule was quite an innovation. The procedure adopted was that used by Mr. Hamilton Davies in the Wilsons & Mathiesons' laboratories.

Improved Oven Performance

Since 1923, when the Regulo was introduced, there has been a marked improvement in the performance of ovens in the hands of the consumers, owing to the great popularity of thermostatic control. After the first world war the improvement in design was such that 20-25% saving was effected in the gas required for oven operations. In the inter-war period there was little change in the thermal efficiency of ovens, effort being concentrated on the improvement of the quality of the cooking.

Some years ago we spent a lot of time studying the effects of products of combustion on foodstuffs, and obtaining an understanding of the cause of the formation of the reddish substance which appears on joints cooked in gas ovens and is not noticed when similar joints are cooked in externally heated ovens. The reddish substance is nitroxyhæmoglobin, the material which is responsible for the red colour of corned beef. I am sorry we were not able to claim that it was a new accessory food factor, or had any particular merit other than to improve the appearance of the joint, but experience indicates that the material passes through the human system unaffected.

The new gas cookers we are now starting to produce after this last war will show a further saving in gas consumption as compared with the best gas cooker we manufactured in 1939.

Water Heaters

To-day, water heaters of the instantaneous type yield lower efficiencies than were attainable with those available in the opening years of the century. I well remember one open type geyser which at its normal consumption operated at an efficiency of 97% gross c.v. To reduce production costs the overall height was decreased somewhat and, if my memory is not at fault, the efficiency was dropped to 90%. To-day the efficiencies of the instantaneous type are appreciably lower—80% is the maximum and 70% is accepted. The transfer efficiency in the case of circulators of the older type did not exceed 80%, whilst those made to-day yield an efficiency also between 70% and 80%. The greatest developments that have taken place have been in the direction of ensuring:—

(1) That the combustion shall satisfy the hygienic standards now accepted for all gas appliances, and

(2) that the apparatus shall be designed so as to minimize maintenance, although the change-over from the condensing to the so-called non-condensing heater has probably increased the maintenance problem. Certainly, the materials used in construction are more readily attacked under the so-called non-condensing condition—this is due to the formation and subsequent concentration of sulphuric acid.

Whatever the subject under discussion concerning the technical requirements of the Gas Industry, we find ourselves inevitably drawn to the subject of sulphur. I understand that on the whole there has been a definite decrease in the sulphur content of gases during the last 30 years, certainly when computed on the basis of grains per 100 cu.ft., although I am not aware of any records relating the sulphur content to the output in therms.

From the domestic utilization point of view, the Industry has been too long in making up its mind to reduce sulphur. The effects of the sulphur products, as indicated, are particularly noticeable in the water heater field; in the case of circulators, by using special materials for the combustion chamber and minimizing incipient condensation, corrosion can be much restricted, if not entirely eliminated.

Development

Modern industrial development in any industry is determined by the research or investigational work which is undertaken. Only a few years ago, before the Gas Research Board was formed, the Industry relied largely on the activities of a few of the members of its three sections—the manufacturers of gas, manufacturers of plant and manufacturers of appliances, for development work. Such firms undertook systematic experimental work because they realized it paid to do so. A certain amount of co-operative research has, however, been carried on throughout the whole of the period under review, this largely centred in the activities of the Coal Gas department at Leeds University. From the point of view of the Industry the results attained have been good—in fact, they can be described as very good when the outlay involved is borne in mind. In view of the competition of other fuels and the activity in other industries, it is, however, essential that the town Gas Industry shall devote more energy to research, and there is much scope for co-operative work in the utilization field, especially in connexion with problems of a background nature.

From the competitive standpoint it seems that the best results in the near future will be obtained from utilization research while the profits that accrue from manufacturing research will come from improvements in the elasticity of the gasification process, *e.g.*, improving the ability to deal with seasonal loads. It is my view that in the future the survival of an Industry will depend on the active prosecution of research, planned to ensure a steady accretion of useful knowledge—haphazard work alone will not suffice—fundamental and applied research directed towards specific objectives is needed.

Utilization Research

Recently I felt moved to suggest that more thought should be given by the Gas Research Board to the problems of utilization. It must be admitted that the main improvements effected in the last 30 years have largely resulted from a natural endeavour on the part of those concerned to improve the goods they had to offer, at least in the field of domestic appliance production. The gas cooker is certainly one of the best, if not the best, means that can be put at the disposal of the housewife for

* Summary of an Address to the Annual Meeting of the London and Southern District Junior Gas Association, May 16. A full report of the Address will be published later in "GAS".

the preparation of food for the table, and a reasonable case can be made in support of the thesis that developments which have taken place in the design of the appliance have been planned developments.

In securing the domestic and commercial cooking loads, a wise step was taken by the Gas Industry. This load is now the basic domestic load. It must not only be retained, but should be used to secure the main part of the remaining domestic fuel load.

Whole House Heating

On the other hand, in the case of space heating the position is not so clear, and many in the Gas Industry still do not appreciate the problems involved in satisfying the space heating needs of the country.

Whole house heating is coming, and it is for the Gas Industry to make up its mind what it is going to do to take full advantage of this golden opportunity. Will it act as a whole, or once again leave it to the progressive few to shoulder the burden?

Will those who are concerned with the manufacture and supply of gas say definitely whether they can undertake the provision of the fuel required for the whole of the space heating of our houses? Has serious consideration been given to the effect of such a load on the operation of gas making plant, and can an indication be given of the price at which it will be possible to supply gas for such a purpose? Public opinion is being educated to demand a greater degree of comfort than that with which the masses have been satisfied in the past. It is for the Gas Supply Industry to say, and to say without much delay, whether it wishes to undertake the work of heating houses completely instead of heating some room intermittently, and, if it wishes to secure this load, does it propose to offer gas, or coke, or a combination of gas and coke?

Gas Engineers' National Guild

Report on the First Year's Working

DURING the last 20 years there has been a considerable amount of dissatisfaction among gas engineers and their staffs with regard to salaries and conditions of service, and the formation of the Guild is the first real attempt to set up a competent organization to deal with salaries and conditions of service in the Gas Industry. The loyalty of gas engineers and their staffs to the Industry is traditional. They will go to any length in the maintenance of the supply of gas and in the improvement of the efficiency of the Industry. The amazing thing, however, is that previously gas engineers have failed to set up any organization to look after their own interests, and in this respect they differ from those engaged in other professions. The personal outlook of those engaged in the Industry has undergone a radical change in the last year or so, as a result of the Government's declared intention to nationalize the Gas Industry. It, therefore, now becomes more essential than ever that there should be a competent and fully representative organization to look after the interests of those engaged in the Industry.

In June, 1946, it was decided that such a body must be formed without delay and on July 9, 1946, the first meeting was held of a Committee of representatives of each District. A Drafting Sub-Committee prepared a prospectus. Printed forms of application for membership were sent out towards the end of August, 1946, qualification for membership at that time being Corporate Membership of the Institution of Gas Engineers.

The Interim Committee, with Mr. G. E. Currier as Chairman and Mr. J. M. McLusky (Calverley) as Hon. Secretary, was responsible for the management of the new Guild. The Draft Constitution and Rules were agreed on Nov. 4, 1946, and at this meeting Dr. G. E. Foxwell was appointed Secretary of the Guild, *pro. tem.*, Mr. J. M. McLusky being Treasurer. Approximately 500 applications for membership had then been received, and there was a feeling that the door for membership should be opened wider.

An Ordinary Meeting of members of the Guild decided on Nov. 26, 1946, that (a) there should be only one class of member and (b) membership should be restricted to those with technical qualifications. Membership comprised: (a) Corporate Members of the Institution of Gas Engineers, (b) Chief Technical Officers of Gas Undertakings and/or Coke Oven Plants, (c) persons serving in the Gas Industry or the Coke Oven Industry who are corporate members of any of the following technical bodies: The Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Electrical Engineers, the Institute of Fuel, the Royal Institute of Chemistry, or any other body approved by the Managing Council. The entrance fee of two guineas was to be continued and the annual subscription was fixed at one guinea to three guineas according to the Members' emoluments. The Rules of the Guild were subsequently printed and circulated.

A Salaries Sub-Committee was appointed on the same day, Mr. F. Dawson, of London, being the Chairman. Scales of salaries for chief engineers and deputies were agreed on Jan. 14 of this year and on the following day a letter was sent to the Federation of Gas Employers requesting that a committee be set up by the Federation to negotiate scales of salaries with a Sub-Committee of the Guild.

At a meeting on March 12, the Interim Committee of the Guild approved the Scales of Salaries, and also had a discussion with Dr. Badger regarding negotiations with the Federation of Gas Employers. It then transpired that the Central Committee of the Federation of Gas Employers had agreed to set up a Special Committee to negotiate scales of salaries with the Guild, and this Special Committee would be composed of six persons, three being Directors of Gas Companies and three Chairmen of Municipal Gas Committees, and it was understood with regard to the appointment of the latter that the assistance of the Association of Municipal Corporations was being sought.

At this meeting on March 12, the Interim Committee gave careful consideration again to qualifications for membership of the Guild, and regarded the position as one of such urgency that it was decided that the Secretary should send a statement to every member of the Guild, together with the new proposals of the Interim Committee re membership, and include it with the Ballot Form, so that members could vote for or against the new proposals.

The proposed new qualifications for membership were as follows:—

1. Chief Executive Officers of all Gas Undertakings (other than Working Managers) over 20 million cu.ft. per annum (100,000 therms per annum).
2. Deputy Chief Executive Officers of all Gas Undertakings over 500 million cu.ft. per annum (2½ million therms per annum).
3. Chief Engineers of all Gas Undertakings over 20 million cu.ft. per annum (100,000 therms per annum).
4. Deputy Chief Engineers of all Gas Undertakings over 500 million cu.ft. per annum (2½ million therms per annum).
5. Station Engineers of all Gas Undertakings over 500 million cu. ft. per annum (2½ million therms per annum).
6. Distribution Engineers or Superintendents of all Gas Undertakings over 500 million cu.ft. per annum (2½ million therms per annum).

The postal ballot on the above proposals resulted in a substantial majority in favour.

It was intended that membership of the Guild should be open to persons with the necessary qualifications serving on coke oven plants, but the response from that quarter has been negligible.

Qualifications for membership of the Guild have throughout the last twelve months been a source of considerable worry and concern to the members of the Interim Committee. In an Industry where there is such a tremendous variation in the magnitude of an undertaking, ranging as they do from the village gas-works to the Gas Light and Coke Company, with all the variations in personnel in the different sized undertakings, it was only to be expected that these qualifications for membership would present a difficult problem. Any new organization has its teething troubles, and the Interim Committee of the Guild have probably made mistakes, but at least it can be said that while changes in the qualifications have been made from time to time, they have been for the better. It is now proposed that there shall be a further change in the qualifications for membership as follows:—

RULE V—MEMBERSHIP.

1. Members shall be elected by the Managing Council and shall comprise:—
   (a) Chief Executive Officers of all Gas Undertakings producing or selling over 20 million cu.ft. per annum (100,000 therms per annum).
   (b) Deputy Chief Executive Officers of all Gas Undertakings producing or selling over 200 million cu.ft. per annum (1 million therms per annum).
   (c) Chief Engineers of all Gas Undertakings producing or selling over 20 million cu.ft. per annum (100,000 therms per annum).

(d) Deputy Chief Engineers of all Gas Undertakings producing or selling over 200 million cu.ft. per annum (1 million therms per annum).
(e) Station Engineers of Works producing over 200 million cu.ft. per annum (1 million therms per annum).
(f) Distribution Engineers, Distribution Superintendents, or Area Managers of Gas Undertakings controlling areas in which is distributed over 200 million cu.ft. of gas per annum.
(g) Persons holding the positions stated in (b), (d), (e), and (f) above in undertakings, works, or areas respectively below the size limits stated therein who are Corporate Members of a Chartered Engineering Institution, of the Institute of Fuel, or of the Royal Institute of Chemistry.
(h) Industrial Gas Engineers who in the opinion of the Managing Council hold positions entitling them to membership of the Guild.
(i) Such other persons as in the opinion of the Managing Council hold positions entitling them to membership of the Guild.

It is hoped that these latest proposals will receive the approval of the Annual General Meeting of Members of the Guild which has been called for Tuesday, June 3, at 4.45 p.m., at Unitas House, 24, Livery Street, Birmingham, and it is also hoped that no further alterations will be necessary.

Some members holding responsible positions in the Gas Industry have not yet joined the Guild, for a variety of reasons. It cannot be too strongly emphasized that it is in their own interests to do so forthwith. It is not possible for the Guild to take action on behalf of those who are not members. In the event of nationalization, the Ministry of Fuel and Power would much prefer to have one organization such as the Guild with which to discuss such problems as compensation, pensions, &c., rather than deal with individuals. The senior and qualified executives of the Industry must have such an organization so that it can speak with a strong united voice.

With the Guild as now constituted, and with the subscriptions now fixed, it will be difficult to find adequate reasons for withholding support from the Guild. It may be that many of the seniors engaged in the Industry are satisfied with their present terms and conditions of service, but no one can be certain that those terms and conditions will be continued indefinitely. Even should there be persons in such a happy position, it is still submitted that it is their paramount duty to join and support the Guild wholeheartedly, even though they are unlikely to derive personal benefit from membership. Their support will be of material assistance to their professional brethren in the Industry.

In its short existence, the Guild has been very active, and the members of the Interim Committee are particularly pleased that:

1. Scales of Salaries have been set up for Chief Engineers and Deputies for the purpose of negotiation with the Federation of Gas Employers.
2. The approach made to the Federation of Gas Employers has been sympathetically received, so much so that this body is now setting up a Special Committee to negotiate with the Guild on Scales of Salaries.
3. The Guild has given a considerable amount of assistance and advice to many gas engineers as to salaries and conditions of service in private negotiations now being undertaken with their Committees or Boards of Directors.

Junior Associations' Activities

THE June number of "GAS" bears further testimony to the zeal with which the Junior Gas Associations are approaching the present and potential problems of their Industry. The Papers published range over a wide field of management and administration, works control and practice, and domestic utilization, and the discussions are no less productive of constructive ideas.

London Convention Papers

We have already commented editorially in the "JOURNAL" on the Address on "Management and Administration," by W. K. Tate (Portsmouth), the Paper on "Heat Services in New Houses," by G. C. Holliday (Gas Light and Coke Company), and the Paper on "The Technical Basis of Works Practice," by C. Stott (South Metropolitan Gas Company) which were presented at the 1947 Convention of the London and Southern District Junior Gas Association. All three appear in full in the June number of "GAS," and they well repay re-reading, not only because of their inherent merit, but because they reflect the attitude of mind of the Junior of to-day. Discussion was necessarily brief because of the time factor. The recorded comment and criticism has, we know, been followed by much helpful informal debate among those who were ruled out of the formal discussion by the clock.

Indicators and Recorders

Measurement of rate of flow by the several variations of the differential pressure method, together with the measurement of pressure generally, is discussed by A. L. Hancock (Walker, Crosweller & Co., Ltd.), in a Paper on "Fluid Flow and Pressure Indicators and Recorders" to the Western Junior Gas Association. There are three ways, he says, in which the reading of a flow meter may be presented, namely, indication, recording, and integration. Indication guides the immediate operation of the plant; very often it also provides material for written records in the form of periodical entries in a log sheet. In such cases it is clearly better to let the instrument draw its own chart, plotting the reading continuously on a time basis. Such records enable present values to be compared with earlier readings. Average values can be obtained and in the case of flow records the total quantity of flow may be calculated readily. Integration presents the total quantity of flow by automatic means. The essential function of an integrator is to multiply rate of flow by time, continuously, and to show the result on a counter as quantity.

Technical and Chemical Control

Efficiency of gas production and process work in the Gas Industry has reached a stage where the human element is the limiting factor, and automatic control is becoming essential if higher efficiencies are to be obtained. In a Paper on "Technical and Chemical Control of Gas-Works" to the London and Southern District Junior Gas Association, S. G. Vane (Southampton Gaslight and Coke Company) mentions a few instances of automatic control and emphasizes the necessity of recording apparatus in order to follow completely a particular plant or process. Realizing that cost is a main consideration he goes into considerable financial detail to show that the control department of a works such as that at Southampton can operate at a very low cost, and in many cases show a profit. Certain capital expenditure must be made on control and recording instruments, but the repayment, depreciation, and maintenance of this charge represents only about 0.026d. per therm. The value of complete records, consistency of production, and the assurance that each unit is receiving sufficient maintenance is in itself, he concludes, compensatory for the control expenditure having regard to the total value of the plant involved. In his introduction the Author invited useful, constructive criticism—and he got it in the discussion which followed the presentation of the Paper.

Petrol for Peak Load Gas

Service is always the Gas Industry's objective, says E. Crowther, who next week becomes Senior Vice-President of the Institution of Gas Engineers, in a topical talk to the Scottish Junior Gas Association (Western District), and he refuses to believe that having come with credit through the war the Industry will be any less successful in meeting the rapidly changing problems of reconversion. He deals with shortages in all their aspects, service, competition in the labour market, and the technical implications of present conditions. He mentions especially his recent suggestion to the Ministry of Fuel and Power that for peak load periods petrol might be used with advantage for gas manufacture. One ton of petrol so employed would replace the gaseous therms obtainable from the carbonization of at least five tons of coal. It would be quite practicable, indeed, to discontinue the carbonization of a million tons of gas coal per year by using less than 200,000 tons of petrol in this manner. The process was operated with success (using benzole instead of petrol) at Newcastle during the extreme peak period in February, and the Author is optimistic that considerable use may be made of petrol, relieved of tax, during the next few years, with great benefit to the coal situation. Two present obstacles are that the petrol at present generally available has been treated with tetraethyl lead, which renders the products of combustion possibly injurious in domestic use, and the incidence of the tax.

Walsall Town Council has approved a recommendation of the Gas Committee to arrange an exhibition of appliances at the Staffordshire Agricultural Show to be held at Walsall on June 20 and 21.

Wales and Monmouthshire Association of Gas Engineers and Managers

Presidential Address*

of

E. M. EDWARDS, M.Inst.Gas E., A.M.I.Mech. E.

(Port Talbot)

THE Wales and Monmouthshire Association of Gas Engineers and Managers has a proud and honoured record of achievement, and I value greatly the honour you have conferred upon me in electing me as your President. Throughout the whole period of my connexion with the Association, for six years of which I was privileged to act as your Secretary, I have experienced in full measure the warm-hearted fellowship of all members. As your 42nd President I follow an illustrious band of gentlemen who have set an exceedingly high standard of tradition and attainment. I will do my best to emulate the example of my predecessors, and so endeavour to further the interests of the Association.

The Association is primarily a technical organization, which is affiliated to the Institution of Gas Engineers, and the field of usefulness of the Association is enlarging in the light of the rapid developments that are taking place in the scientific application of fuel technology in its widest aspect. The future will, I trust, present opportunities of close and co-ordinated relationship with kindred associations and organizations, whose activities are connected with the preparation and utilization of various forms of fuel and power.

As the development of the Port Talbot Corporation Gas Undertaking has, during recent years, presented rather unusual features, it may not be out of place if I submit for your consideration information of certain aspects of the problems encountered, policy followed, and the results attained.

Port Talbot Undertaking

In 1866, the Aberavon Corporation purchased the Port Talbot gas undertaking from the Aberavon Gas and Coke Consumers' Company, when gas was manufactured at the Water Street Works. In 1906 a new works was erected on another site at Aberavon, and the Water Street Works closed. At that time the Aberavon Corporation supplied Aberavon, also the area of the Margam Urban District Council. In 1914 Margam U.D.C. erected their own gas-works at Margam, and Aberavon Corporation ceased to supply gas in the Margam area.

In 1922 the position changed completely when the Aberavon, Margam and Cwmavon areas combined to form the Borough of Port Talbot. The new authority then had in commission gas-works at Aberavon, Margam and Cwmavon. Soon after the amalgamation of the authorities, the Cwmavon Works was closed down and a bulk supply provided from Aberavon. The Aberavon Works and Margam Works remained in commission, and at different periods a supply of coke oven gas was taken at Margam Works.

Prior to my appointment as Engineer and Manager of the undertaking in 1932 the Corporation had decided to erect an installation of eight 50-in. Glover-West continuous vertical retorts at Aberavon gas-works, in place of an obsolete horizontal retort installation, and the work had been commenced prior to my appointment.

Planned Development 1932-1947

In 1932 the position of the undertaking was extremely serious. We were faced with declining sales of gas, and the circumstances were made more serious by reason of the reduced purchasing power of our consumers, due to the very large numbers of men who were unemployed. The annual trading accounts had shown a net loss for several years, and the district auditor had drawn attention to the excessive bank overdraft.

*Presented at the 42nd Annual Meeting, Cardiff, May 21st

The situation was faced courageously by the Corporation, who have unfailingly shown their confidence in the development of their gas undertaking as an important and essential public service. It was decided not to adhere to the policy of restrictive economy, but to plan with confidence and vision for the expansion of the undertaking. In formulating the short term and long term policies for the re-establishment and development of the undertaking the following broad principles have been followed:—

i. To ensure the availability to all existing and potential consumers of a gas supply of suitable quality and pressure.

ii. To centralize gas production completely at the Aberavon Works.

iii. To eliminate all sources of waste and inefficiency in the use of labour and materials.

iv. To avoid needless capital expenditure, and to finance capital expenditure from revenue as far as possible.

v. To develop energetically the sales of gas to existing consumers, and to extend the distribution system to additional consumers.

vi. To improve the standard of consumer service of the Department.

vii. To render available to all consumers, on long period easy payment terms, of the most efficient and modern gas appliances procurable.

viii. To reduce gas prices.

ix. To assess as accurately as possible, and keep constantly in mind, the potential development of gas supplies in the area for domestic, commercial and industrial purposes.

x. To organize and operate upon modern commercial lines the administrative and sales sections of the undertaking.

Effect of the Policy Followed

During the last 14 years the policy adhered to has enabled us to convert a debit balance of £1,900 on the Appropriation Account to a credit balance of £28,684. During the period we have increased the annual gas output from 166.1 million cu.ft. to 795.6 million cu.ft., although the total loan debt outstanding is now £38,696 less than it was in 1932. In addition, we have during the same period defrayed capital expenditure to the amount of £24,461 out of revenue. I set out in tabular form certain data that may prove of interest. (Full details for the year ended Mar. 31, 1947, cannot yet be given because the accounts for the year are not yet available.)

	1931-32	1945-46	1946-47
Gas output in million cu.ft. ...	166.1	734.4	795.6
Gas sales in million cu.ft. ...	153.2	704.4	
Number of consumers ...	6,878	10,037	
Price of gas to quarterly meter consumers, per therm ...	11.765d.	10.58d. to 8.70d.	10.58d. to 8.70d.
Price of gas to prepayment meter consumers, per therm	13.882d.	12.0d.	12.0d.
	£	£	£
Gross profit	8,180	19,469	
Net profit	(loss) 924	(profit) 4,936	
Appropriation account ...	Dr. 1,900	Cr. 28,684	
Total income from gas sales ...	34,712	98,968	
Loan debt outstanding ...	75,556	36,860	

Included in the total gas output for 1946-47 is 262.2 million cu.ft. of unpurified gas sold for industrial purposes. The calorific value of purified gas is 425 B.Th.U. per cu.ft., and of unpurified gas 485 B.Th.U. per cu.ft.

The figures given for gas prices show that despite the very heavy increases that have taken place in the cost of coal, materials and labour, and considerably higher income tax

charges, our gas prices are lower than they were in 1932. We are to-day selling gas to our domestic and commercial consumers at the same rates as those that prevailed in 1939. The prices to large scale industrial users are slightly higher than in 1939. Only the flat rate prices have been included in the preceding schedule. In addition we offer to our consumers a two-part tariff for domestic purposes, and special rates of charges for gas used for commercial and industrial purposes.

In 1937 I had the pleasure of reading to the Association a Paper dealing with distribution and sales methods at Port Talbot. This Paper had particular reference to schemes we were developing for the sales of appliances, gas prices, data in respect of the two-part tariff we had introduced for our domestic consumers, and observations upon unaccounted for gas. There is no necessity for me to recapitulate the information then given beyond saying that the policy then defined has been continued satisfactorily.

An examination of the position of the undertaking to-day shows that the success of the undertaking is largely attributable to the increased revenue from gas sales, although there are many other factors involved. As long as gas sales continue to develop, the progress of the undertaking, financial and otherwise, will be assured, and it is to this end that we must direct our energies. It is true that, at the present time, restrictions placed upon the use of fuel to some extent limit our opportunities. My faith and creed is that we should not be discouraged by the present day circumstances, but rather that we should look ahead with vision to the certain future when such restrictions will no longer apply, and we should plan accordingly.

When we formulated our development programme, as the result of reasoned consideration I formed the conclusion that the ultimate potential development of the Undertaking was 2,000 million cu.ft. per annum. This appears to be a bold statement when we see that our actual annual output was only 166 million cu.ft. in 1932, but in the light of our experience I do not see any reason to change my opinion of the ultimate long term possibilities of the undertaking.

Engineering Development

To deal with the engineering work involved in the programme we have carried out would occupy more time than is available, but concisely stated the general outline could briefly be indicated as follows:—

1932.—Completion of first installation of vertical retorts, condensers, exhauster, wet purification plant.

1933.—Completion of an extension to the installation of vertical retorts, removal of purifiers, steam boilers, and other plant from Margam to Aberavon, extend distribution system and install plant for filling gasholders at Margam and Cwmavon at off peak loads from the low pressure distribution system. Extend showrooms.

1935.—Install Dri-gas plant, and naphthalene washer. Introduce automatic control for station governor pressures.

1936.—Install benzole recovery plant. Install coke grading and screening plants and coke bunkers.

1937.—Purchase new and modern central premises for Showrooms, Offices, and Distribution stores and workshops.

1938.—Renew Cwmavon gasholder.

1939.—Prepare for war. Provisional order for distribution of unpurified gas. Arrange for the obtaining of a supply of coke oven gas, and for the running of a 10-in. high pressure steel main to transmit unpurified coke oven gas from the Margam Works of the Guest, Keen Baldwins Iron and Steel Company to Aberavon Gas Works. Install new electrically-driven boosting set, deepen existing purifiers of 5 ft. depth to 9 ft. 6 in. depth with side discharge doors, lay a new low pressure trunk main from Aberavon Works to the centre of the district—the main being designed for use as a future high pressure main, overhaul and bring into commission a small gasholder at Margam Works.

Throughout the whole of the period steady progress was made with development of all sections of the distribution system and with increasing the service we were able to offer to the public, keeping always in mind the essential principle that progress depended upon sales development.

Wartime Problems

The war presented many problems. Fortunately Port Talbot did not suffer severely from actual bomb attack. Rapidly increasing demands for gas for domestic and industrial purposes were met without fail largely by reason of the excellent service rendered unfailingly by our coke oven gas supplies, to whom I am particularly pleased of having an opportunity to pay public tribute.

With development taking place at such rapidity, innumerable problems naturally arose, and often unorthodox methods were applied. A gas engineer's life is of extreme interest, never monotonous, and ever full of daily problems which offer us a challenge to solve. One rather unusual problem afforded us a considerable degree of perplexity.

In 1943 we discovered serious corrosion was developing at certain parts of a 360,000 cu.ft. capacity three-lift column-guided gasholder. The side sheets were not affected, but serious corrosion was taking place at the following places:

(i) The rollers, spindles and cheek plates of the bottom carriages of the outer lift.

(ii) Rivets below wind and water line in the cup of the second lift. In almost every vertical riveted seam of this cup three rivet heads had disappeared, or had been attacked very badly. The bottom rivets of the three affected were about 5 in. *below* the wind and water level. At the same level the nuts and projecting parts of two of the bolts of each of the vertical stays of the middle lift had been attacked badly. Apart from at two isolated portions there was practically no corrosion of the cup side sheeting at the levels where the rivet heads and nuts of the bolts mentioned were affected.

The corrosion was unusually rapid and serious, and I immediately suspected electrolysis. The corrosion was only taking place at projections from the flat metal sheet surfaces into the water.

A milli-volt meter showed us that a D.C. electric current varying in intensity from 8 to 23 milli-volts was flowing from the lifts of the gasholder to the tank water. There was no difference of potential between any of the guide columns and the tank. The tank was not at earth potential, although it was constructed of steel upon a reinforced concrete foundation at ground level. No readings could be obtained with the milli-volt meter upon the inlet and outlet gas main connexions.

As a result of our investigations we concluded the current was not from an outside source. It appeared the combination of the quality of water and the composition of the rivets, bolts and side plates of the floating parts of the holder caused the holder to act as an electrolytic cell.

The following action was taken, the holder remaining in commission:

(i) The tank water, which was found to be high in chlorides, was diluted with fresh water from the town supply.

(ii) The water overflow was arranged so that water would be displaced from the bottom of the tank by rain water.

(iii) The three lifts were connected together by means of flexible copper cables, and the outer lift was similarly connected to the tank. The tank, also inlet and outlet connexions, were properly earthed by means of copper tape and earthing plate.

(iv) The corroded parts were repaired or renewed.

The measures taken have proved completely effective.

During our tests, with the lifts bonded and the tank earthed, no electrical currents were registered. The bonding wires were then removed and tests taken over periods of three and six hours. After three hours no voltage was measurable, but after six hours 10 milli-volts showed on the test meter. During our investigations cup bottom rollers were examined by means of holes drilled at suitable points, and the insertion of an electric bulb into one of the holes. The cup rollers did not appear to have been affected.

Development from 1947 Forward

It is my firm conviction that the development of the Gas Industry, in the South Wales Industrial area in particular, is closely associated with the utilization of greatly increased quantities of coke oven gas. Conditions in North Wales are dis-similar, as was so ably portrayed in the Presidential Address last year by Mr. O. P. Cronshaw.

In 1939 we were faced with the necessity of making provision to meet further rapidly increasing demands for gas. We entered into a contract with the Guest Keen Baldwins Iron and Steel Company to purchase unpurified gas from the Company's Margam Coke Ovens, and the supply was made available by December, 1940. The original contract quantity of 70,000 cu.ft. of gas per hour has from time to time been increased, and steadily increasing quantities will become available. By March, 1949, 280,000 cu.ft. per hour will be available from the existing coke ovens of the Company.

The Company have now commenced a vast programme of expansion of their works, and incorporated in the project for the large strip mill at the new Abbey Works is the installation of additional coke ovens, whereby considerably greater quantities of coke oven gas will become available. This has an important bearing upon the question of gas supplies throughout the whole of the western area of the South Wales industrial district.

To house the workers at the new strip mill some 2,000 houses will be required within the next few years. In addition, provision has to be made for the extensive normal housing programme of the Borough. In our current programme of development we must make provision for the gas supplies required for the houses referred to. Further, it is our intention to extend our gas mains to outlying villages and set up district showrooms where necessary.

New demands are constantly arising for gas supplies to new and existing factories. We are at the moment making provision for a supply of 20,000 cu.ft. per hour to one factory, and several other projects are in hand.

Included in our current programme is the supply of gas to five large works canteens, and supplies to other consumers for metal cutting, lead melting, heat treatment furnaces, bread baking, and numerous other processes. It is certain that although we have developed considerably since 1932 we will in the next few years find a rapid acceleration in the rate of expansion. Many problems will be met, and they must be overcome.

One of our urgent needs is the extension of purification plant, and as some time will of necessity elapse until new purifiers can be in operation we have arranged with W. C. Holmes and Co., Ltd., to install a liquid purification plant, adapting an existing washer, in order to reduce the quantity of sulphuretted hydrogen entering the iron oxide purifiers. This we anticipate will ease the load upon the existing purifiers until the contemplated large new installation of purifiers is in operation.

Western Industrial Area

The scheduling of South Wales as a development area, with the resultant introduction of many new factories, is creating abnormal increases in the demands for gas. Many undertakings have experienced very considerable increases in their annual output of gas since 1939 and the present productive capacity of their works is being taxed to the limit.

The problem demands immediate solution, and simply to extend gas production plants at all the various gas-works throughout the area would not constitute the real answer. Industry must be supplied with gas in ample quantity at economic prices. Patchwork development of the Gas Industry must be avoided, and development work carried out now should fit in with the ultimate plan for co-ordination of gas supplies throughout South Wales.

The seriousness of the situation has for some time been appreciated by those responsible for the conduct of the gas undertakings in the area, and on Oct. 15, 1946, a meeting was convened by the Ministry of Fuel and Power, and attended by representatives of undertakings in the West Wales Industrial area. At that meeting a Western District Working Party of five gas engineers was appointed, their main tasks being to ascertain the long-term and short-term requirements of the 15 undertakings concerned, and to consider how best the requirements could be met. The Working Party are assisted by two representatives of the coke oven industry.

The area concerned includes the whole of the Western District from Porthcawl to Carmarthen. A similar Working Party has been established in the eastern area of South Wales.

Considerable progress has been made by the Western District Working Party. Draft schemes have been prepared and it is hoped the final report will be completed at an early date. Until the final report has been completed and submitted to the Ministry of Fuel and Power, and to the Undertakings affected, it will be appreciated I cannot refer in detail to the work that is being carried out. There are, however, certain features of general interest to which reference could be made.

A Complete Survey

A complete and detailed assessment has been made of the position of the various undertakings, with estimates of the gas demands for 1949.

A survey reveals the total number of existing consumers is 86,591, and possibilities exist for extension of gas supplies to approximately 18,000 existing houses. In addition, the contemplated housing programme for the next five years would require gas supplies for a further 11,700 houses. A large number of new factories require supplies of gas, and these demands must be met.

A broad outline of the position shows that the existing coke oven gas supplies, plus the productive capacity of all existing gas-works is sufficient to meet the estimated 1949 peak daily demands, with a margin of approximately 2.0 million cu.ft. per day, provided the gas supplies available are taken to the points where the demand exists.

As far as the longer-term programme is concerned I am not free to give figures, but it may well be that when the contemplated new coke ovens at Margam are completed the total quantity of coke oven gas available, including the gas from the Tondu coke ovens, will be more than sufficient to meet the entire demands of all gas undertakings in the West Wales Industrial area, taking as our basis the 1949 estimated requirements.

The Ministry of Fuel and Power have already sanctioned certain work of particular urgency. A 15 in. diameter main is to be laid immediately from Port Talbot to Pyle, and a 10 in. diameter main continued to Bridgend, with a 10 in. diameter connecting main to the Tondu coke ovens. Provision has been made for the laying of a 10 in. diameter main from Pyle to Porthcawl. The work of laying a 10 in. diameter main from Neath to Pontardawe has also been sanctioned.

It will be appreciated the task of the Working Party is one of considerable magnitude, and the preparation of their scheme and report necessitates careful consideration of the many aspects of the situation.

Following is a schedule of specific points which are included in the various matters to which close attention is being given:

1. Assessment of the existing and potential demands of all undertakings.
2. Assessment of the gas production capacity of all gas undertakings.
3. Assessment of available and contemplated future coke oven gas supplies.
4. Consideration of lengths and routes of mains.
5. Examination of various formulae for the calculation of the flow of gas.
6. Decisions upon the estimated costs of laying all sizes of gas mains.
7. Determination of the economic sizes of mains, allowing for capital charges and power costs.
8. Terminal gas pressures required at various gas-works.
9. Interest and amortization charges upon mains, compressors, control equipment and buildings.
10. Period of depreciation upon mains, compressors, control equipment and buildings.
11. Power costs.
12. Purification costs.
13. Gasholder storage.
14. Standardization of calorific value.
15. Specific gravity of gas, and its influence upon transmission costs.
16. Income tax obsolescence.
17. Wayleaves.
18. Metering of bulk supplies.
19. Load factors.
20. Continuity of supply.
21. The degree of urgency of the requirements of various gas undertakings.
22. The condition of plant at existing gas-works.
23. Location of existing and proposed new factories.
24. Coke requirements of the area.
25. The possibility of ultimate connection between the Western and Eastern Areas of South Wales.
26. Rates.
27. Period of contracts.
28. The statutory responsibilities of gas undertakings in relationship to coke oven gas supplies.
29. The desirability or otherwise of providing for future recompression stations.
30. Unaccounted for gas.
31. Distribution of unpurified gas as a temporary measure.
32. Specification for mainlaying work.
33. Effect of income tax upon operating costs.
34. Influence of Distribution of Industry Act, 1945, with particular reference to Section 3.
35. Relationship between the maximum daily demand and annual gas output of the various gas undertakings.
36. Road reinstatement requirements of various road authorities.
37. The advisability or otherwise of laying mains alongside railways.
38. The determination of the economic aspects of the entire scheme.

I have not referred to all matters which require attention in the preparation of bulk gas supply schemes, but the preceding will give some indication of the task confronting the Western District Working Party.

Basic Principles of Bulk Supply Schemes

Within the next few years one of the main tasks of the Gas Industry will be the preparation of schemes of bulk gas supplies in various parts of the country.

A considerable amount of experience has been gained by certain undertakings, and in this respect I would like to pay tribute to the valuable information that has been made available to the Industry by Mr. W. Hodkinson and Mr. H. B. Taylor, of the United Kingdom Gas Corporation.

In view of the importance of the subject I suggest it is highly desirable that the Institution of Gas Engineers should compile, for the benefit of its members, a report on the principles that should be borne in mind and essential data required for the preparation of bulk gas supply schemes. Such information would be of great value to many members.

Coke Oven Gas Supplies

Experience has shown that coke oven gas can be supplied for town gas purposes with complete satisfaction. It is, of course, necessary to ensure that the specification of the gas to be supplied, and the terms of the contracts meet fully the requirements of gas undertakings, who have statutory obligations to fulfil. In this connexion there is a need for a standard form of contract to be drafted by the national organizations of the Gas Industry and of the coke oven industry.

It is in the national interest that full use should be made of all available supplies of coke oven gas. In the case of Port Talbot alone we are at the moment saving 40,000 tons per annum of gas coal because we are purchasing coke oven gas. One important point is the price at which coke oven gas is purchased by gas undertakings.

The essence of a contract is that both the seller and the purchaser should be satisfied. On no other basis can a long-term satisfactory policy be framed. If coke oven gas is to be made full use of by the Gas Industry the price payable must of necessity bear favourable comparison with the cost at which the Gas Industry could manufacture gas in modern large scale carbonizing plant.

The days have gone when coke oven gas could be purchased at low prices as a surplus product. This particularly applies to coke ovens associated with steel works, where the internal fuel policy of the works has a measure of flexibility.

The advance in fuel technology, and realization of the greater usefulness of coke oven gas has enhanced its value in the eyes of the sellers. At the same time it must be realized that the price which gas undertakings can afford to pay for coke oven gas is determined by the true economic value of the gas to the gas undertakings.

Training for Management

One aspect of the education and training schemes of the Gas Industry that does not appear to receive sufficient attention is that of training for management. As younger engineers progress to positions of greater responsibility within the Industry they find their attention is devoted to an ever increasing degree to functions of administration and management. While a thorough technical training is essential to engineers who aspire to the control of gas undertakings, it is equally as important that younger engineers should be afforded an opportunity of receiving thorough training in administration and management. The suggestion is one which I commend to the earnest attention of those responsible for developing further the education schemes of the Gas Industry.

As we are all aware the Government have declared their intention to nationalize the Gas Industry, and we are naturally concerned as to the effect upon the Industry we serve. We are well aware of the differences of opinion which are expressed by various sections of Industry, but we cannot gainsay the need for a substantial measure of co-ordination and integration of the various units comprising the Gas Industry. My personal view is that if nationalization of the Gas Industry is to take place there should be as little delay as possible between the announcement of the Government's intention and the accomplishment of its purpose. A prolonged interim period of uncertainty is not conducive to development.

Whatever the future may hold, it will remain our duty to serve the public and the nation with our utmost sincerity and inflexible honesty of purpose.

Gasification of Oil

The Regional Gas Engineering Advisory Board has performed valuable work in assisting undertakings to improve the thermal efficiency of operation of their gas production plants, and the members continue to be available to give assistance to their colleagues when required. In this connexion I would urge all undertakings, in view of the seriousness of the coal supply situation, to take full advantage of the facilities that now exist for the gasification of oil in carbonizing plants.

The future of our Industry is dependent largely upon the younger men, many of whom we are glad to see have returned after service with H.M. Forces. It remains our clear duty to encourage these young men to take advantage of every opportunity of improving their knowledge of the Industry. I am certain that undertakings will continue to give every support to the development of the Wales and Monmouthshire Junior Gas Association, and to the work of the District Gas Education Committee.

Kind words and verbal encouragement are not enough to young men. They must be paid salaries commensurate with their qualifications and capabilities, particularly in this age when it is necessary for chief officials to delegate their authority in greater degree. Unless we are able to attract and retain young men of high standards of attainment, the Industry will be hampered greatly in its development.

When endeavouring to look forward into the future I do not think we should be unduly pessimistic. Each age brings its trials, and if we fail to face with courage and resolution whatever may lie before us we are not worthy of our heritage. I have boundless confidence and faith in the continued development of our Industry as a vital public service which will contribute to the well being of our country.

Society of British Gas Industries

The following Officers and Council have been appointed by the Society of British Gas Industries for the 1947-48 session:

President, Sir Frederick J. West, G.B.E.; Chairman, D. Rider; Vice-Chairman, H. S. Cheetham.

Chairmen of Sections: Section 1, J. S. Simpson; 2, R. M. Goodman; 3, F. B. Holmes; 4, L. Hartley; 5, Norman Smith; 6, F. A. Hooper; 7, W. R. Edgar; 8, Major W. Gregson; 9, P. Hopkinson; 10, R. L. Gardner; 11, F. H. Wilkinson; 12, N. Wilton; 13, L. Walker; 14, no nomination; 15, T. A. McKenna; 16, G. Ewart; 17, L. B. Lambert; 18, D. T. Barritt.

Hon. Treasurer, Col. O. B. F. Planck; Hon. Secretary, Alderman G. Clark.

Elective Members: R. B. Potter, L. A. Bratt, R. J. Rogers, J. A. Drake, A. Watson, G. W. Allott, H. F. Potter, T. F. C. Potterton.

In the concluding paragraph of our reference last week (page 384) to the annual report, a printing error substituted the word "plants" for "plans" in the sentence: "During the coming year the Government's plans for the future of the Gas Industry will presumably be revealed."

Games, Whist, Dancing, and broadcasts of the big fight and Budget speech were among the attractions at the annual social given by the Directors (of whom Mr. J. D. Speakman, Major M. N. T. Gubbins, and Mr. M. H. Stothert were present) and management of Sutcliffe, Speakman & Co., Ltd., when about 500 employees were entertained on April 15. Guests included retired servants of the Company, representatives from the Fern Mill and McGregor Bros. (allied concerns) and trade union officials. Replying to a vote of thanks proposed by Mr. J. N. Darwell and seconded by Miss B. Parr, the Managing Director (Mr. J. D. Speakman) said the annual party was growing in numbers and enjoyment year by year. He paid tribute to the Works Consultative Committee which though newly formed was already doing good work in helping each to see the other's problems.

Practical Progress in Water Treatment*

By PHILIP WEDGWOOD, B.Sc.

WATER softening and boiler water conditions are subjects which have received a conssiderable amount of attention, and many Papers have been read which describe different plants and processes. The chemical reactions involved are well known, and it is not proposed to deal with that aspect of water treatment in this Paper, the main object of which is to bring to notice some results which have been obtained since a modernized plant was put to work about two years ago at the Hemel Hempstead Works of the Watford and St. Albans Gas Company.

Some years ago it was felt that feed water treated by conventional methods with lime and sodium carbonate could not be considered to be satisfactory for boilers, particularly tubular boilers which were designed for high outputs. In the Gas Industry not only do we require high thermal efficiency, but a high factor of availability. I mean by this that it should be possible to keep boilers at work continuously for as long as they may be required to maintain the necessary output of steam, or until the statutory inspections are due. Stand-off periods for cleaning and maintenance work should be minimized, and so the number of reserve steam raising units might be reduced, thus reducing capital costs. So far as labour costs are concerned the ideal state would be reached if the necessity for internal cleaning could be eliminated altogether.

The water treatment plants in all the Company's works were lime-soda units, because that process when properly controlled is reliable, and gives consistent results, coupled with low costs and a comparatively low concentration of soluble solids in the boiler feed water. The great drawback of this process lies in the fact that the calcium cannot be removed completely. The treated water is unstable, and will deposit calcium carbonate in storage tanks and pipe lines. If the water contains silica—and in most parts of the Eastern District the concentration of silica is high enough to cause trouble—there is a strong possibility that scale will be deposited on the heating surfaces which contains a high proportion of silicate, which is a most undesirable kind of scale to have in any type of boiler. The effects of scale and the mode of formation of different kinds of scale have been dealt with adequately elsewhere. Various means of preventing the deposition of scale have been proposed, and with some of them a measure of success has been achieved, but is it not wrong to look upon steam boilers as chemical reaction tanks in which water treatment processes may be completed? Even if the formation of hard scales is prevented, there are still some difficulties with deposits of sludge in the boilers, some of which forms a coating of variable thickness on the water heating surfaces.

In my Company, which is expanding at a high rate, the steam raising plant has had to be pressed to the limit. Waste heat boilers and boilers of the economic type are taking up an ever-increasing proportion of the load, and I would not deny that some difficulties, most of them due to scale, have been experienced. It was decided that the cause of these difficulties, arising out of the use of incompletely treated feed water, should be eliminated.

With this objective in view, the whole subject was given fresh thought to see how completely a new process, or combination of processes, could be developed which would satisfy all our requirements under the varying conditions existing on our three gas-works. These requirements may be summarized as follows:

1. To eliminate any possibility of scale formation, calcium and magnesium must be removed as completely as possible.
2. There being no method at present for removing silica, it was decided to rely upon the alkalinity of the boiler water as the means for dealing with it.
3. The total solids in the feed water were to be reduced to the absolute minimum to reduce blow-down to the lowest limit, to save fuel and conserve treated water.
4. The alkalinity of the feed water was to be as low as possible, having regard to (3) and the maintenance of such conditions within the boiler as would satisfy our requirements in respect of silica and at the same time enable us to avoid any possibility of corrosion.
5. The plant should comprise the smallest number of separate units to minimize first cost, subsequent maintenance charges, and the daily labour required for its operation and control.

It was decided, after full consideration, to retain the lime-soda softening plants and to complete the treatment in zeolite units. Ordinary zeolites lose efficiency when the grains become coated with calcium carbonate, as they do when dealing with lime softened water, and they are not easily revived. They are affected adversely if the water is very alkaline. As we already had enough trouble with high silicate scale we decided not to have sand filters. Furthermore, it was decided to have the smallest number of plant units and to conserve water. This led us to the conclusion that carbonaceous zeolite should be used in the new plant. Carbonaceous zeolite is a synthetic ion exchange material produced by the sulphonation of coal. It can be treated with acid *in situ* if the plant and connections are rubber lined, and it is a most efficient filtering medium. Thus it was decided to eliminate a filtration plant for the lime treated water.

The material used in the Hemel Hempstead plant is "Soucol," a synthetic carbonaceous zeolite manufactured by Joseph Crosfield and Sons, Ltd., for water treatment[1]. The process then required three units of plant following the lime softening plant:

1. A filter to remove calcium carbonate carried in suspension.
2. The carbonaceous zeolite "stabilization" filter.
3. A zeolite base exchange softener to remove the remaining "hardness."

By "stabilizing" the lime-softened water before base exchange treatment, calcium is removed from it, which otherwise would be taken out in the base exchange unit, and thus the soda alkalinity of the finished water is reduced by an equivalent amount. This has the advantage that the soluble solids in the feed water are reduced.

The practical application of the process has been developed by Filtrators, Ltd., in collaboration with Crosfields, and it was decided to install a small plant at Hemel Hempstead, which was designed by the former Company. After some discussion and full consideration we also decided to go a step further to see if all our requirements could be satisfied with a single unit of plant following a lime or lime and soda softening plant[2].

The Chemistry of the Process

At this point it is necessary to describe the process and what happens in the carbonaceous zeolite bed, because even the most practical paper on water treatment could not be complete without some reference to the chemistry of the process. I find that most engineers still think in terms of "grains per gallon," so I have expressed all the results on that basis.

It has been stated that lime treated water is not stable, and that it will deposit calcium carbonate on standing in tanks and in pipe lines and feed pumps, and that it has been found possible to overcome this problem by passing it through a bed of carbonaceous zeolite. The zeolite acts as a catalyst and completes the lime-carbonate reaction. Calcium carbonate is precipitated on the grains, and any excess of lime is also absorbed. That this reaction is not one of base exchange is shown by the fact that the carbonaceous zeolite is preferably used in the "spent" condition—that is, after it has been used for the softening of water up to the point of exhaustion with calcium and magnesium salts.

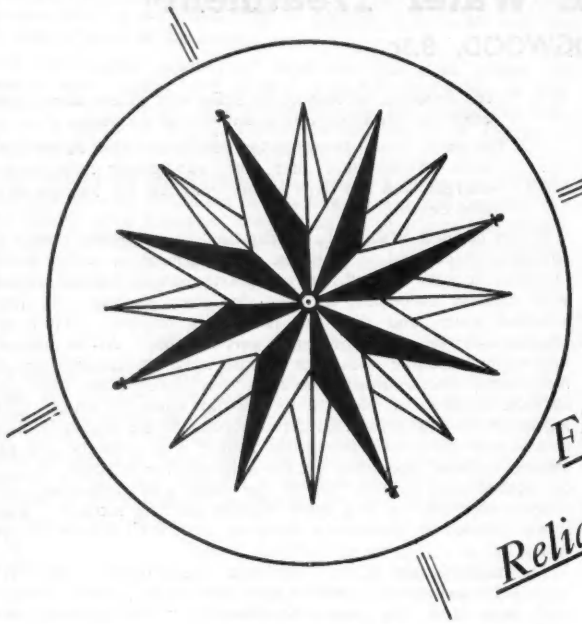
A specimen of water which contained 8.4 grains per gallon of temporary hardness and 8.4 grains per gallon of permanent hardness, expressed as calcium carbonate was treated in the laboratory with lime, and the following results were obtained:

Alkalinity to methyl orange	4.2
Alkalinity to phenol phthalein	2.8
Hardness, excluding permanent hardness present in untreated water	4.2

The water then contained all the original permanent hardness, but the calcium due to carbonate and hydrate respectively had been reduced to 2.8 and 1.4 respectively.

*Paper to the Eastern Association of Gas Engineers and Managers, Spring Meeting, Chelmsford, May 23.

CARDINAL POINTS



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The Full Moon, and Mars in trine with Neptune, indicate heavy drought in Asia Minor but it's nothing to the drought in Britain these days between eight and ten p.m. Water, water everywhere, that's all there is to drink. You will be faced with a very serious personal problem just now, the answer to which is either 'yes' or 'no.' You'll have to decide for yourself, however. Why should we do all the work? Your lucky number is 99 reversed. Your next lucky number is 66 reversed, so you should be pretty safe either way.

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After passing the water through a bed of "spent" carbonaceous zeolite the figures became:

Alkalinity to methyl orange	0.7
Alkalinity to phenol phthalein	nil
Hardness, excluding the permanent hardness of the raw water	0.7
Reaction. pH value	7.6

Finally, after zeolite softening the following results were obtained:

Total alkalinity	0.7
Caustic alkalinity	nil
Total hardness	nil
Reaction. pH value	7.6

This water after the final stage of the treatment has the characteristics which are desirable for boiler feed purposes. The sodium bicarbonate present would maintain the boiler water in a sufficiently alkaline condition to prevent deposition of silica. The quantity of carbon dioxide evolved in the boiler would be small and only equivalent to that formed by decomposition of the sodium bicarbonate because all free CO_2 and practically all of the combined CO_2 is removed during the treatment.

Regeneration of the carbonaceous zeolite is normally carried out by washing the bed in an upward direction with diluted hydrochloric or sulphuric acid. Our well water has low permanent hardness, and it was decided that this also should be removed in the same zeolite bed by a further regeneration with brine to produce water of zero hardness.

Thus the regeneration procedure which afterwards became standard practice is as follows:

1. The bed is first flushed upwards with water to remove the calcium carbonate which has collected on the surface of the zeolite.
2. This is followed by regeneration with dilute acid in sufficient quantity to remove the alkalinity from the top layers of the bed. At the same time the bottom layers are partially regenerated, hydrogen ions replacing some of the calcium and magnesium ions.
3. The acid regeneration is followed by sodium chloride brine, also by upward flow, sufficient in quantity to replace these hydrogen ions by sodium ions, so that the lower portion of the bed is in the neutral condition.

Description of Plant

This consisted of a reaction tank having a diameter of 6 ft. with a total vertical height in the straight of 8 ft., and was equipped with central mixing tube and single point draw-off at the top of the tank. The raw water was passed through a preheater mounted above the tank and then treated with lime from a lime saturator and soda from drip feed dosing gear at the top of the mixing tube. The treated water, after passing down the mixing tube, flowed upwards through the body of the tank where sedimentation of the precipitated calcium carbonate took place; the partly clarified water finally passed to a wood wool filter external to the reaction tank and thence to the boiler feed tank. The reaction tank gave a retention time of approximately three hours at a rate of flow of 400 gall. per hour.

The average "hardness" of the softened water was five grains per gallon as $CaCO_3$ with excess caustic alkalinity due to free calcium hydroxide, and there was considerable "carry-over" of calcium carbonate in suspension in the water passing to the feed tank from the wood wool filter.

It was decided to modify it as follows, at the same time increasing its capacity from a maximum of 400 to 600 gall. per hour:

1. An annular collecting trough was fitted at the top of the existing lime soda reaction tank to ensure uniformity of draw-off of the softened water to eliminate short circuiting in the body of the tank when using a single point draw-off.
2. A second reaction tank, having a diameter of 5 ft. and a total height of 8 ft. 6 in., was installed for the first stage of the softening process to provide a total reaction and sedimentation period of 3.6 hours at a rate of flow of 600 gall. per hour. This tank was equipped with central tube for mixing the hard water with lime suspension, annular draw-off trough, and cone bottom for collection of the sludge.
3. The existing lime and soda proportioning equipment was discarded and a meter operated, single acting chemical plunger pump with variable stroke was installed at ground level, together with a lime mixer having an agitator continuously operated by an electric motor to maintain a uniform lime suspension.
4. A carbonaceous zeolite "stabilizing" filter of the combined type as described above was installed. The filter vessel had a diameter of 2 ft. with a vertical height in in the straight of 5 ft. 6 in., and was charged with a volume of 9.5 cu.ft. of carbonaceous zeolite to treat the lime softened water at a rate of flow of 600 gall. per hour for a continuous period 24 hours between regenerations. The steel filter vessel was rubber lined throughout for protection against the acid regenerant, and valves and pipe lines coming into contact with acid were rubber lined also. A centrifugal pump was installed to deliver the lime softened water through the zeolite filter to the boiler feed tank. The existing wood wool filter was eliminated.

Originally a small steam injector was used to supply the regenerating solutions. This was discarded in favour of a hand pump, and at a later date this was replaced by a much more satisfactory and convenient motor driven centrifugal pump.

Originally hydrochloric acid was used, but later, because it is cheaper, sulphuric acid was used for regeneration after dilution to a concentration of 1%, but this has a disadvantage because the length of time required for the operation is increased. A higher strength of acid cannot be used on account of the danger of forming a coating of calcium sulphate on the surface of the zeolite grains.

The Water Supply

The raw water is pumped from a well in the chalk, and has the following average analysis:

Total hardness as $CaCO_3$	18.9	grains	per	gall.
Temporary hardness as $CaCO_3$ ...	18.2	,,	,,	,,
Permanent hardness as $CaCO_3$ ...	0.7	,,	,,	,,
Total alkalinity	18.2	,,	,,	,,
Sulphate as SO_4	1.65	,,	,,	,,
Chloride as Cl	1.12	,,	,,	,,
Silica as SiO_2	1.4	,,	,,	,,
Free carbon dioxide	3.15	,,	,,	,,
Reaction—pH value	7.1	,,	,,	,,
Probable combinations.				
Calcium carbonate	15.0	,,	,,	,,
Magnesium carbonate	2.56	,,	,,	,,
Magnesium sulphate	0.91	,,	,,	,,
Sodium sulphate	1.33	,,	,,	,,
Sodium chloride	1.86	,,	,,	,,

The Results Obtained

It is considered that the encouraging results which have been obtained will be of interest to many technicians in Industry, and they provide an example of what can be achieved by close co-operation and mutual assistance between contractors whose job it is to provide plant for a particular purpose and the people who have to use it.

In Table I are shown the average results obtained during an initial period of six months. They include erratic results arising out of teething troubles incidental to the development of a new process and plant, and the figures obtained when the zeolite unit was purposely run beyond the point of exhaustion to obtain necessary data. Furthermore, most of the tests were done at the end of the run before regeneration.

TABLE I.

Hardness	0.59
Alkalinity to phenol phthalein	0.47
Alkalinity to methyl orange	4.3

In more recent months the average "hardness" was reduced to 0.33°, and during many weeks the "hardness" was actually zero, and it is known that this can be maintained, provided the necessary minimum of attention is given to the plant and the testing of water samples is reliable. Under such conditions the phenol phthalein alkalinity also is removed and the pH value is of the order of 7.5 to 8.0. The total solids in the treated water are only about six to eight grains per gallon, which represents a distinct improvement over the product from conventional plants.

In Table II are given average results of nine typical runs with the zeolite unit to determine the practical limitations of the plant in respect of its capacity for work between regenerations. They illustrate the changes which take place as lime and

GLOVER-WEST *Vertical Retorts at* COVENTRY

"It is no longer considered necessary that the buildings housing Gas Works plant should be of a purely utilitarian character. For comparatively little extra expenditure it is possible for these buildings to be of such a character as to maintain and even raise the prestige of the Gas Industry in the eyes of the consumer and of the public as a whole."

COMMUNICATION No. 230—PROCEEDINGS OF THE INSTITUTION OF GAS ENGINEERS, 1939-40.

In this photograph of the fourth Installation of Glover-West Vertical Retorts at the Foleshill Works, Coventry, the coke storage hoppers with screening plant above are seen in the foreground. The retort house lies to the left. Space between is reserved for the duplication of the carbonizing plant. The project for the complete installation is sketched below.

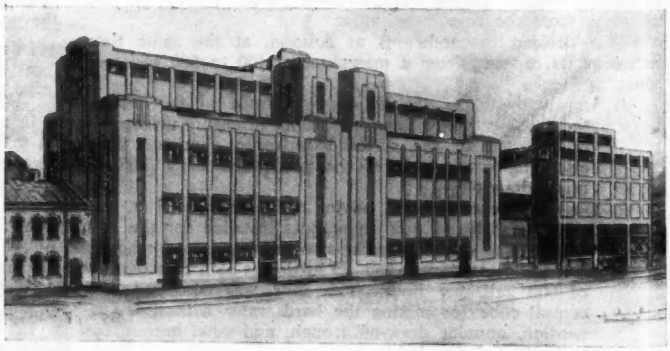
West's Gas Improvement Co., Ltd.

Miles Platting, MANCHESTER 10

Telephone: Collyhurst 2961-2-3-4-5.
Telegrams: Stoker, Manchester.

London Office:
COLUMBIA HOUSE, ALDWYCH, W.C.2.

Telephone: Holborn 4108-9.
Telegrams: WESGASCO, ESTRAND.



soda treated water passes through the vessel during run periods. From such tests as these it has been demonstrated that the capacity of the zeolite in respect of "hardness" removal is about 7,000 grains of calcium carbonate per gall.

TABLE II.
Leaving Zeolite Unit

Gallons of Water Treated.	Hardness Grains/Gallon.	Alkalinity PP.	Alkalinity MO.	pH.
1,000	nil	nil	3.7	
2,000	nil	nil	2.63	7.2
4,000	nil	nil	2.2	7.24
6,000	nil	nil	2.1	7.42
8,000	nil	nil	2.1	7.31
10,000	nil	nil	1.74	7.56
12,000	nil	nil	2.16	7.70
14,000	nil	nil	2.47	7.75
14,400	trace			
15,600	1.0			
16,000			2.5	7.81
16,900	2.0			
17,400		trace	2.9	8.2
20,000	3.1	0.3	3.1	8.4

The average test results on the pre-treated water entering the zeolite unit were:

Hardness.	Grains per gall.	3.80
Alkalinity	PP.	1.94
	MO.	4.37

By adjustment of the quantity of acid and salt used for the regeneration of the zeolite the alkalinity of the treated water can be controlled. Obviously it is undesirable to have the alkalinity too low, so it is considered advisable to state that never on any occasion while this plant has been at work—*i.e.*, nearly two years, has the pH value of the treated water been less than 7.0. This is an interesting point.

On examining the records of all tests made during eight months in 1946, we found that 165 tests were made when the water was completely softened—*i.e.*, zero hardness by the standard soap solution test. The lowest pH was 7.0. The averages of these figures were as follows:

Hardness	nil
Alkalinity to phenol phthalein	nil to trace
Alkalinity to methyl orange	2.7
pH	7.6

There are still many people who hold that boiler feed water should contain some scale forming salts to form a thin protective coating on the heating surfaces to prevent corrosion. I would ask, how long does it remain thin, because scale is bound to accumulate, and how thick must it be to prevent the ills which it is claimed to avoid? In my opinion, perfectly clean boilers, both internally and externally, should be the objective to be reached as soon as possible. It is expected that an extended period of experience with this method of water treatment will prove that scale formation can be avoided by removing the offending constituents from the water outside the boilers, where it should be done, and that corrosion inside the boilers will also be avoided at the same time without any necessity for supplementary treatment of the water before it enters the boilers.

Acid and Salt Used for Regeneration of the Zeolite

It was estimated at the outset that 0.35 lb. of salt per 1,000 grains of calcium carbonate removed would be required to regenerate the reaction bed. In practice with this particular plant we have found that over a period 0.44 lb. was used. Lower figures have been obtained when close control was exercised. When comparatively inexperienced operators have controlled it 0.5 lb. has been sufficient to ensure zero hardness. Thus some allowance is made for variations in the lime-soda treated water which are always liable to occur. It is expected that these figures will be improved with future plants.

As regards acid, we expected to use 0.075 pints of 95% sulphuric acid per 1,000 grains of alkalinity removed expressed as calcium carbonate. The acid serves a double purpose inasmuch as it is also relied upon to remove free calcium carbonate filtered out of the lime-soda treated water. Actually, about 0.16 pint has been used to maintain satisfactory results.

Filtration

Neither a wood wool nor a sand filter was provided, purposely. We relied upon the carbonaceous zeolite to deal with precipitate coming over from the lime softening plant, and the results have justified our reasoned hope and expectation. The bed has been examined on three occasions for the purpose of observing its efficiency in respect of filtration, and it was found to be perfect. The calcium carbonate was all on the surface of the bed as a thin coating with a clear line of demarcation between the precipitate and the zeolite. It was removed fairly completely by back flushing with water in the very first stage regeneration.

In the natural order of things this brings me to a matter on which some comment is necessary. This material, "Soucol," is comparatively light, and it is graded between 20 and 40 mesh. If the flushing rate is excessive some zeolite is removed from the vessel in the stream of water. Consequently the rate of flow must be controlled carefully and a means provided to prevent the safe maximum velocity from being exceeded. In this particular plant such a rigid control has not been exercised, partly because I wished to know the worst that could happen under such ordinary day-to-day conditions of control and operation as might exist on any works.

I am satisfied that with ordinary care the losses are small, and with good control almost negligible. Furthermore, any fine zeolite which does escape can be trapped by providing a tank or pit to receive the waste water before it escapes to the drains, and this we have done.

Temperature of the Water Treated

Before leaving the purely process side of the subject one other interesting point is worthy of mention. It had been stated that deterioration of the carbonaceous zeolite probably would occur if the temperature exceeded 80°F. This plant has been operated for long periods, using warm water from the coal gas condenser at temperatures between 95°F. and 110°F. No deleterious effect has been noticed, and some results of further investigation in this connexion would be valuable, because the use of such heated water improves the thermal efficiency of the works, and lime softening is much more effective at elevated temperatures, thus reducing the load to be borne by the zeolite unit.

Results in the Boilers

Having dealt with the purely chemical and operational aspects of the process, I turn now to the practical results observed in the boilers.

Most of the steam used on this works is generated in the waste heat boiler in the horizontal retort house. The balance is supplied by a Lancashire boiler, and another Lancashire boiler is held in reserve. These Lancashire boilers had thick coatings of very hard scale, which was difficult to remove by chipping and scraping. Since the new softening plant was put to work they have been worked for periods of six months instead of three months before they were taken off for cleaning and inspection. At each inspection an improvement in their condition has been observed. Gradually the scale is being removed, and there is no evidence of corrosion.

A few weeks ago some scale from one of the boilers was analyzed, the honeycombed interior surface being separated from the very hard original scale. The results are given below:

	Hard scale adhering to heating surface %	Honeycombed surface layer of scale %
Calcium carbonate	6.0	10.1
Calcium silicate	85.8	72.8
Calcium sulphate	not determined	2.8
Ferric oxide	2.3	2.8
Magnesium oxide	0.9	3.0
Water and organic matter ...	1.6	6.9

As it is carrying practically the whole of the load and is operating nearly up to its maximum capacity, the case of the waste heat boiler is more interesting. It was purchased second-hand a few years ago, and the tubes had a thick coating of rock hard scale, varying in thickness from one-eighth to five-sixteenth inch. It was taken off at intervals for cleaning, but little impression was made on the scale until the new plant went into operation. Since that time the total solids in the boiler water have been high, although the total solids in the feed water were very low. It was obvious that this was due to removal of the old scale. This boiler also has been taken off for inspection and washing out with the hose at six-monthly intervals, and the improvement in its internal condition and its efficiency has been most marked. Parts of the inlet tube plate, the shell, and parts of tubes were thoroughly cleaned down to metal by chipping and scraping over a year ago, and when last inspected these parts were still perfectly clean. There was no

sign of any new deposit and no sign of corrosion. Scale had broken away from tubes in places, and pieces of scale which were knocked off for examination measured in thickness between one-sixteenth and barely one-quarter inch. It was evident that where the scale was broken the water was working its way under the scale and detaching it from the tubes and that it was only retaining its hold because there was a complete circle of scale round the tube.

A sample of this boiler scale which was tested last year also showed a lower silica content than the original scale.

	Original.	Scale in 1946.
Calcium as CaCO%	32.5	33.1
Silica %	37.8	32.7

Analyses of Feed Water and Blow-Down Water

Some average results obtained in September, 1946, are tabulated below. The "hardness" of the pre-treated water was 4.3 grains per gall.

Feed Water.	Grains/Gallon.
Hardness	Trace
Alkalinity to phenol phthalein	Trace
Alkalinity to methyl orange ...	3.95
Total solids	7.55
Silica	1.00
Chlorine (Cl_2)	1.06
Sulphate (SO_4)	1.36
Reaction pH	8.0 (approx.)
Waste Heat Boiler Water	**Grains/Gallon.**
Soluble solids	368
Insoluble solids	237
Total solids	605
Soluble Solids in Boiler Water.	
NaOH	37.5
Na_2CO_3	37.5
SiO_2	21.4
SO_4	62.8
Cl_2	59.3
Quantity of water treated per day	8,550 gallons
Salt used per day for regeneration	15 lb.
Acid used per day for regeneration	4 pints

Basing calculations on the results of analyses, the approximate percentage of water blown down can be determined thus:

$$\text{On chlorine content} \quad \frac{106}{59.3} = 1.78\%$$

$$\text{On sulphate content} \quad \frac{136}{62.8} = 2.16\%$$

$$\text{On soluble solids} \quad \frac{755}{368} = 2.05\%$$

These figures given an average of about 2%.

Actually the instructions were to blow-down 1½ in. in the gauge glass once per shift, which would be 2.5% when evaporating 8,000 gall. per day and 2% for 10,000 gall. per day. The notable feature of these results is the high concentration of insoluble solids in the blow-down water.

It would appear that scale was then being removed from the boiler at the rate of about—

$$\frac{237 \text{ grains} \times 200 \text{ gall.}}{7{,}000} = 6\tfrac{3}{4} \text{ lb. per day.}$$

Judging by its appearance whenever it has been examined, I would say that this is not improbable. Here I wish to stress again that we have not observed any evidence of corrosion taking place in either this waste heat boiler or the Lancashire boilers.

Costs

The next subject to which I must refer is the cost of the process. Different undertakings allocate costs in different ways, but I think it is desirable that some actual comparative figures should be given.

The averages of figures given in the monthly Costs Analysis for 23 months for water softening, which includes materials and plant attendance, at our three gas-works are as follow:

Hemel Hempstead	8.20d.	1,000 gall. of water
Watford	8.05d.	„ „ „ „
St. Albans	7.3d.	„ „ „ „

At St. Albans the water is pumped from a well in the chalk. At Watford river water was used for part of this period and town supply for the remainder. The average cost at Watford during the last eleven months while using the town water supply was 7.63d. per 1,000 gall. Thus it can be said that a very satisfactory product is being obtained from the new plant for an additional cost of less than 1d. per 1,000 gall. This will be well covered by the savings on internal cleaning of the boilers and the improvement of thermal efficiency. Perhaps it is too early to estimate what these savings will be.

I would like to acknowledge the valuable assistance given to me by Mr. W. H. Owen, the Works Engineer at Hemel Hempstead, and Mr. Leslie Streatfield, of Filtrators, Ltd., in the work which has been done, and in the preparation of this Paper, which I trust has been of interest and may be of some value to you.

Finally, I wish to thank the Chairman and Directors of the Watford and St. Albans Gas Company for permission to present it at this meeting.

References:
(1) Joseph Crosfield and Sons, Ltd. B.P.No. 484,494.
(2) Filtrators, Ltd. B.P.Nos. 576,014, 576,019.

An Industrial Design Competition

A competition organised by *Art and Industry* and sponsored by De La Rue Gas Development, Ltd., offers a first prize of 100 guineas, second prize of 50 guineas, and third prize of 25 guineas, for the best design submitted for an exhibition stand for the display of De La Rue gas appliances. There will be a further special prize of 25 guineas to the author of any design actually used. The judges of entries submitted will be Mr. A. L. B. Leigh Ashton, S.S.A., Director, Victoria and Albert Museum, Mr. L. H. Hardern, Public Relations Officer, Gas Light and Coke Company, and Mr. G. Grey Wornum, F.R.I.B.A.

Competitors are offered the opportunity to design an exhibition stand to show De La Rue multipoint gas water heaters, De La Rue neat gas cookers, De La Rue gas refrigerators, and Potterton gas-fired boilers (for domestic central heating and storage hot water supply) of various types to the best advantage.

Entrants are in no way restricted to architects or architectural students, and any prospective entrant should address his enquiry for full particulars of the competition to the Editor, *Art and Industry*, 66, Chandos Place, W.C.2, marked "Exhibition Stand."

Infra Red at the B.I.F.

Gas-fired infra red (radiant) panels and their application to industrial drying of painted and other articles were demonstrated at the Birmingham B.I.F. stand of De La Rue Gas Development, Ltd. A full scale working demonstration consisted of spray booth, convertible 24-panel tunnel, with overhead conveyor in continuous operation. The rest of the stand was designed to display articles of great variety treated by the process and photographic enlargements of large and small plants in use by well-known manufacturers. Cards showing the convection and infra red drying times for each article portrayed the reduction of time by the De La Rue gas-fired panel process, usually averaging one-tenth of convection methods.

Gas Undertaking Results

United Kingdom Gas Corporation.—The directors recommend a final dividend of 4½% (actual), less tax, for 1946, payable on June 24, making a total dividend of 7% for the year (compared with 6% for 1945). Net trading profit for 1946, subject to audit, amounted to £160,000, compared with £137,470 for the previous year.

Hornsey Gas Company.—The fixed and long-term assets account shows that the amount of new capital spent during the year ended Dec. 31 was £19,248, most of which was accounted for by the purchase of meters and appliances. A sum of £7,861 was provided for depreciation, making the net outlay to date £381,445. The revenue account shows an increase of nearly £35,000 in the cost of coal; the principal reason for this was the increase in the quantity of coal carbonized, but the average price was up by 2s. 1d. per ton. Other manufacturing expenses were also higher as a result of the increased quantity of gas made. On the distribution side, nearly £4,800 more was spent on the repair and renewal of mains and services. Over £40,000 more was received from the sale of gas; the quantity sold showing an increase of 23%. The sum of £38,672 is carried to net revenue account, compared with £34,351 for the previous year. After meeting debenture interest and income tax, and providing £6,384 as a reserve towards further maintenance and repair work, the profit available on the year is £12,250. The rates of dividend permitted by the Company's Acts and Orders are £5 2s. 6d.% on the 5% stock and £3 12s. 6d.% on the 3½% Stock, substantially less than the rates regularly paid before the war. Dividends at these rates were paid in 1945 and for the half-year ended June 30, 1946, but in the second half-year the Directors decided to take advantage of the Gas (Maximum and Standard Prices) Order and General Direction, 1942. This Order modifies the application of the sliding scale by allowing certain of the increases in costs which have occurred during the war to be taken into account in calculating the dividend payable, but if it is applied, the rate of dividend must be limited to 1% below the average rate paid for the three years before the war, subject to an exception providing that a dividend of 5% may be paid if the reduction of 1% would bring the dividend below this rate. Dividends for the December half-year make the dividends for the year £6 8s. 9d.%, less tax, on the 5% stock, and £5%, less tax, on the 3½% stock. The sum of £14,259 remains to be carried forward to the credit of the current year, compared with £13,737 brought in. The number of gas consumers at the end of the year was 27,225, which was a record in the history of the Company, and 1,000 more than the number supplied at the end of 1945. Since the end of the year the increase in the demand for gas has continued, and the output for the first three months of this year was 9% above that for the same period in 1946.

South Midland Gas Corporation.—Profit for the year ended Mar. 31, after charging income tax and all other expenses, was £6,054, against £5,141 for the previous year, making with the balance brought forward a total of £7,750 available for appropriation. A final dividend of 3%, making 6% for the year, the same as for the preceding year, leaves a balance of £2,412 to be carried forward, against £1,695 brought in.

Company News

Drakes, Ltd.—The 45th annual report and accounts covering the year to Dec. 31, 1946, show a trading profit of £38,454 compared with £33,030 for the previous year. Net profit carried to appropriation account was £15,114, against £8,435. After transferring £5,000 to revenue reserve and providing for preference dividend, an Ordinary dividend of 10%, less tax, has been declared, leaving £20,618 to be carried forward, against £16,404 brought in.

Ewart and Son, Ltd.—Mr. Spence Sanders, Chairman, in his statement issued with the annual report and accounts, reports that the accounts show a profit for the year of £3,113, but a profit of £2,972 from realization of investments is included. In fact, normal trading activities during the year resulted practically in a "square" position with neither profit nor loss. So far as the balance sheet is concerned, the main changes comprise (a) an increase of about £16,000 in the book value of buildings and plant; (b) an increase of about £54,000 in stocks and work in progress; and (c) an increase in the creditors and bank overdraft of about £77,000. All these are natural consequences of the changes arising in the transitional period from war-time to peace-time activities. The year 1946 was in the main a period of building up and it is hoped in the current year to reap the benefit of the work upon which the Company has been concentrating in the period covered by the accounts. It has improved its manufacturing capacity by extending premises, and modernizing and reorganizing plant and machinery. It has improved the design and methods of manufacture of existing products, brought into production a new model of sink heater, and reached an advanced stage of development of new designs. Improved amenities for workpeople have not been neglected. A subsidiary Company—Ewart Catering Equipment, Ltd.—has made a promising start under the able management of Mr. Bernard H. Wallis, and orders for Aquafont Boilers and other catering equipment call for expansion of present capacity. The toolmaking business, Hildred Bros., has had another year of steady industry, and has earned a satisfactory profit. In conclusion, the Chairman mentions that the Company has been fortunate in securing the services of Mr. W. E. Reed, who has joined the Board on a full time basis, as Technical Director. Mr. Reed is an experienced engineer, and has rendered valuable service to the Company in the reorganization of its factories. He is now devoting his attention mainly to the co-ordination of development with production and sales.

Gas Stocks and Shares

Prices tended to decline in the industrial market in the early part of the week owing to increased selling, but in most sections there was a recovery towards the end of the week. In the gas stock market prices remained steady, and all the changes were in an upward direction with the exception of Montevideo and Primitiva Holdings. No dividends have been received by the latter company from any of its subsidiaries, and the profit has dropped from £19,666 to £1,210. A warning by the Directors last year that the 2% dividend then paid would be the last which could be expected has been fulfilled. Because of the expropriation of its assets by the Argentine Government in 1945, the Primitiva Gas Company of Buenos Aires made a loss in 1946 of £52,918, against a profit of £26,801 in the previous year. Changes in gas stock prices during the week were as follows:

OFFICIAL LIST		
Bristol Gen. Cap. 5 p.c. max.	110 —115	+ 2
Commercial ord.	84 — 87	+ 1
Gas Light & Coke ord.	22/6— 23/6	+ 3d.
Do. 3½ p.c. max.	79 — 84	+ 1
Imperial Continental cap. (x.d. May 14)	124 —129	— 4
Liverpool 5 p.c. ord.	114 —119	+ 1
Montevideo Ltd. ord.	127 —132	— 1
Primitiva Holdings, Ltd. ord.	11/— 13/-	— 1/6
South Metropolitan ord.	95 — 98	+ 1
Do. 6 p.c. irred. pref.	122 —127	+ 3
South West. G. & W. Ltd. ord.	19/— 21/-	+ 1s.
Sunderland ord.	123 —128	+ 2
United Kingdom ord.	22/ — 24/	+ 6d.
Do. 4½ p.c. 2nd non cum. pref.	19/6— 21/6	+ 6d.
Watford and St. Albans ord.	110 —115	+ 2

Gas Products Prices

The London Market

May 24.

There are no changes to report in the prices of Coal Tar products.

The Provinces

May 26.

Average prices for gas-works products: Pitch, 75s. per ton; toluole, naked, North, 90's, 2s. 4d. to 2s. 6¾d. per gall.; pure, 3s. 2¼d. Prices for carbolic acid 60's anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.) and strained anthracene oil are controlled by Government Orders. Prices for road tar are increased by one penny per gall. by S. R. & O. 1947, 177, under which Order there are also increases in the prices of naphthalene.

Scotland

May 24.

Supplies are readily sold as available.

*Refined Tar.** Yield to the distiller is 6d. per gall. ex works, naked. *Creosote Oil.* Timber preserving quality* 5¼d. to 6¼d. per gall.; Hydrogenation Oil* 5¾d. per gall.; Low Gravity or Virgin Oil† 7¼d. to 7½d. per gall.; Benzol Absorbing Oil 6½d. to 8d. per gall. *Refined Cresylic Acid* is 3s. 6d. to 4s. 6d. per gall. ex works, naked, according to quality. *Crude Naphtha*† 7d. to 8d. per gall. *Solvent Naphtha.** Basic maximum prices delivered in bulk 90/160 grade, 2s. 10d. per gall., and 90/190 Heavy Naphtha, unrectified, 2s. 0½d. per gall.; Rectified, 2s. 4d. per gall. *Pyridine.*† 90/160 grade 15s. per gall., and 90/140 grade 17s. per gall.

* Price controlled. † Uncontrolled

ONX FIRE CEMENT

ANOTHER GAS COMPANY states on Nov. 27th, 1944:

'We are pleased to report on the satisfactory way your special Patching Cement stood up on a repair to the front wall of one of our settings. The repair was round the producer charging hole, having to stand up to the worst conditions being subject to the heat from the setting, abrasion of hot coke, and cold quenching water, and is still standing up well after three months.'

Sets like a ROCK under heat

ONX 'SUPER 83' BRAND for RETORTS

A.L.CURTIS Westmoor Works CHATTERIS Cambs.

E. E.
JEAVONS & CO. LTD.
TIPTON
Contractors for
GAS DISTRIBUTION

Telephone: TIP. 1621 Telegrams: "PIPELINES"

"TULLY" GAS

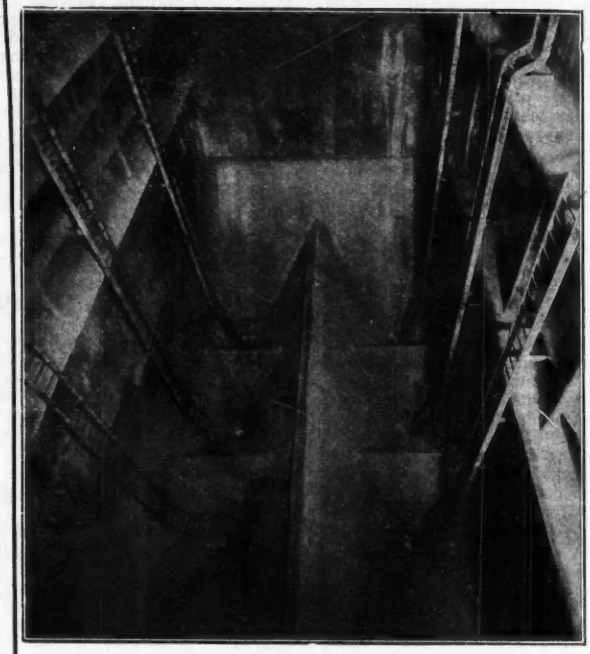
THE IDEAL GAS SUITED TO ALL MODERN NEEDS

ECONOMICAL IN USE AND CHEAP TO PRODUCE

THERE ARE SEVERAL HUNDRED "TULLY" PLANTS IN USE AND NUMEROUS GAS WORKS ARE SENDING OUT ALL "TULLY" GAS

Sole Makers and Patentees:

Gunite is PROTECTION against abrasion



Gunite—concrete applied by air pressure—has numerous applications where its great density and extreme adhesion have particular value.

For lining coal bunkers and steel chimneys it is an ideal material, possessing great resistance to corrosion and protecting steel-work from the abrasive action of the raw coal.

For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained in whatever place the Gunite is applied, thus overcoming the common fault with hand-placed methods.

CONCRETE PROOFING

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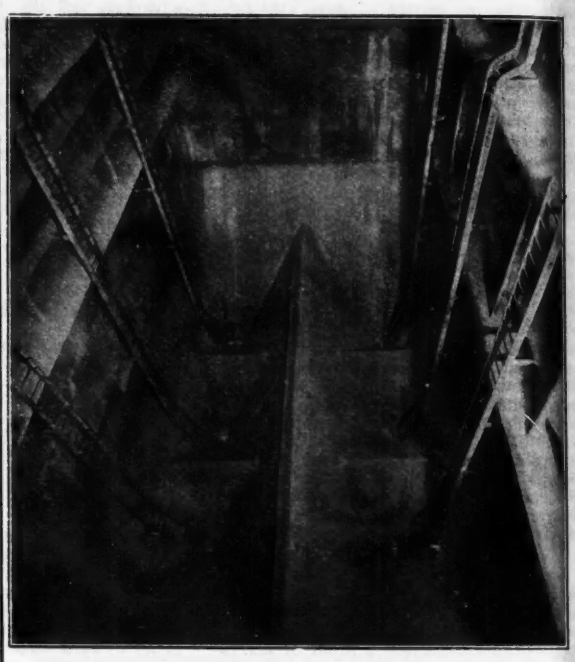

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THE CITY OF BIRMINGHAM

WHEN Domesday Book mentioned Birmingham, it was to the effect that a Saxon tenant held it " in the time of King Edward." At that time Aston, now part of the borough, was the more important place, and the population of Birmingham was perhaps fifty or sixty persons. That number has grown to something over a million, within a municipal area of nearly eighty square miles, and to-day Birmingham is the chief hardware centre of the world and, next to Manchester, the largest manufacturing town in England.

It is estimated that over 1,700 trades are established within its borders, trades varying from ammunition and small arms to children's toys, from railway rolling stock to jewellery, and from motor vehicles to leatherwork and buttons. Its manufactures are far too numerous to detail: tools of all kinds, tyres and rubber goods, glass, chemicals, every type of japanned, galvanized and enamelled ware—the list is seemingly endless. Some of its large plants are household words, the world over; but despite the presence of Dunlop, Morris, B.S.A., I.C.I., G.E.C., Austin Motors, and the Bournville chocolate and cocoa works, small firms predominate ; over 10,000 of them employ less than 30 workers each.

Famous men have been born in Birmingham and many more have found fame within its limits. It was in Birmingham that James Watt, with the assistance of Boulton, perfected the steam engine, that William Hutton became known as one of the greatest historians, and the names of Joseph Parkes, John Bright, Baskerville, and Priestley won their place in the City's scroll of fame. But of all these, we remember more particularly two names—those of William Murdoch and Joseph Chamberlain, the first the inventor of gas, the second Mayor of the City who was responsible for much of Birmingham's municipal enterprise and was the first Chairman of the Gas Committee.

The growth of a country, a town, or an industry is a fascinating study, and in examining the growth of Birmingham it is possible to study all three. For the development of Great Britain as a manufacturing nation is closely bound up with the progress of Birmingham, which itself owes much to the steady growth of the Gas Industry. Our purpose then is to see how Birmingham began, how its industries developed and prospered, and how the Gas Department won for itself by a parallel progress a place of honour in the City's history.

The beginnings of Birmingham's fame as a manufacturing town are rooted deep into the late sixteenth and early seventeenth centuries. Over this period the population was increasing rapidly and to the basic trades carried on by the tanners, graziers, and smiths was added that of the cutlers. Water power operated the machines, cutting the bars of steel into strips, and the Civil War brought a sudden increase of trade to the bladesmiths, whose swords were famous. But the real impetus came after 1675, when Birmingham prospered as the nation's trade improved. A demand for metal buckles and buttons brought about a boom in the brass and copper industries, and at some time during the century a new trade, the production of firearms, appeared. Wars on the Continent kept up the demand for armaments, and muskets and sporting guns were turned out in increasing numbers.

By the eighteenth century the surrounding agricultural land was gradually covered with a network of roads, houses, and small works. The Birmingham trades, both new and old, offered almost indefinite scope for enterprise and the multiplicity of manufactures constantly grew: all kinds of metal fittings or furniture for houses, ships, or coaches ; tools, nails, pins and needles, and everything made from wire; pots, pans, and kettles; and ornaments such as jewellery and picture frames. Richard Ford's stamping and piercing process led to the making of hollow-wares, coins, and decorative goods, while John Taylor's introduction of plating, the production of tubes by means of a drawplate, the development of japanning, and the invention of papier mâché, led to a vast increase in overseas trade. It was at this time too that the greatest innovation of the century—the making of steam engines—came about, and the works of Matthew Boulton became a veritable hive of activity.

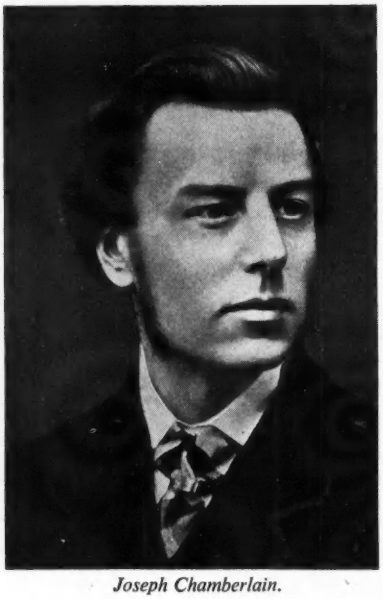
The flourishing trade brought many fresh settlers, and mushroom growth of houses appeared, with little sign of order or design. Simultaneously canals were opened, providing a network of waterways throughout the Midlands. The people had a taste for letters, and in 1779 the Birmingham Library was

opened, commencing in a cupboard in Snow Hill, until subscribers had erected a specially designed building.

Theatres too became popular and the triennial musical festivals were famous throughout the country.

Unfortunately the governing of this rapidly growing town left much to be desired, power still being in the hands of the manor court, of whom Hutton wrote: "The duties of office are little known, except that of taking a generous dinner, which is punctually observed." Accordingly, in 1769, the Street Commission became the chief governing body, whose two main duties were to keep the roadways free from obstructions and to light the main streets by means of the inadequate whale oil lamps. The Commission's early days of rule were not particularly effective, but they made up for this later by undertaking a great system of deep drainage, building the Market Hall and the Town Hall—both of which still stand—and introducing street lighting by gas.

It was in 1802, when Birmingham celebrated the Peace of Amiens, that William Murdoch demonstrated his discovery by illuminating the outside of Boulton's Soho foundry by gas, but it was not until 1817 that gas was used to light the streets. Here another name creeps into our narrative, that of John Gostling, one of those brave pioneers who ran a gas-works single-handed. Within a couple of years his small undertaking, with its two holders with a combined capacity of 55,000 cu.ft., became the Birmingham Gas Light and Coke Company. Again triumph was fleeting, being rudely interrupted in 1825 by the advances of a powerful opponent, the Birmingham and Staffordshire Gas Light Company, which supplied several surrounding towns. The keen rivalry that ensued "was the cause of much inconvenience and Christian indignation to the citizens," for each was out to cut the other's throat, claiming equal rights in the same streets, and even supplying a customer from the other's main in error.



Joseph Chamberlain.

At this time the Street Commission was suffering from insufficient power and revenue to govern the town effectively, and a strong feeling was afoot that the increasing size and importance of Birmingham entitled it to be a borough, with its own elected council, its own bench of magistrates, and its own Quarter Sessions. The great Reform Act was carried in the summer of 1832 and made Birmingham a Parliamentary Borough, thus paving the way for a Municipal Charter. This long-awaited Charter of Incorporation was received in Birmingham in 1838, constituting a corporation of a Mayor, sixteen Aldermen, and forty-eight Councillors, and dividing the Borough into thirteen wards. Its new importance was significantly preceded by the opening of the Birmingham and Liverpool Railway the previous year, and celebrated in the same year by the opening of the Birmingham and London Railway, thus rendering it far more accessible to tradesmen and buyers, who flocked to the Borough eager to participate in this El Dorado of money-making trade. New buildings included the Saltley Training College, the Birmingham and Midland Institute, "The Queen's Hospital" and "The Queen's College," and the Free Grammar School. In 1846 the first performance of "Elijah" in the Town Hall made musical history.

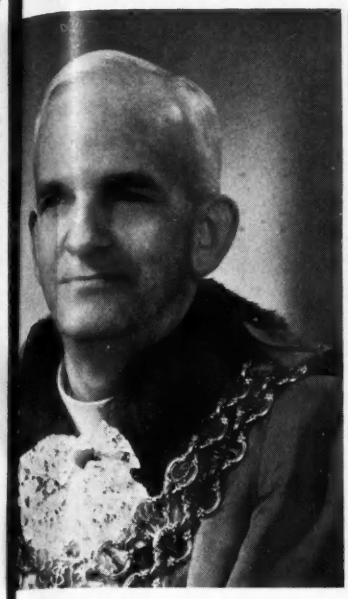
Unfortunately living conditions among the ordinary populace left much to be desired, and the death-rate in some quarters of 50 and upwards, and the infant mortality rising to 200 per 1,000 prompted an investigation. Rawlinson's report on housing and sanitary conditions in 1849, confirmed by a later report in 1874, started a drive to rid Birmingham of the cholera, diphtheria, and typhoid epidemics which threatened the safety of its inhabitants. In addition, at least 50% of the children ran wild, neither at school, nor in work, and social planning and legislation were clearly inadequate to meet the situation.

It was into this scene of progress in one direction and neglect in others that Joseph Chamberlain, then eighteen years of age, entered in 1854. Entering the Town Council in 1868, he became Mayor in 1873. a position he held with distinction for three years before succeeding George Dixon as third member of Parliament for the Borough. He left the Town Council in 1880 when he entered the Cabinet of the second Gladstone administration.

Meanwhile the feud between the two gas companies continued unabated, although they had hopes of amalgamating in order to make a concerted defence against the accusations of an infuriated Council and public. In 1874 both companies presented Bills to Parliament, firmly opposed by Chamberlain and the Town Council. The two undertakings became public property in 1875 as a result of the passing of the Birmingham Corporation Gas Bill, and thereafter Chamberlain, elected Chairman of the first Gas Committee, set himself to develop and improve the service which had so long been allowed to lapse. In the same year Swan Village, the largest gas-works in the country when it was built, fifty years before, was taken over. The Windsor Street and the Saltley works were well placed and served by the canal system, and the new works at Nechells Green completed a comfortable triangle, equipped with rail, road and canal communications. A fourth works, of small proportions and some thirty years old, stood in Adderley Street, near to the centre of the borough. Birmingham, which included Edgbaston and a third of the parish of Aston, was at this time astonishingly compact, its population of 360,000 occupying an area of only 5,900 acres. The task of distributing its 2,000 million cu. ft. of gas direct from the holders throughout the whole borough was a fairly straightforward one, and the price of gas varied between 3s. and 3s. 6d. per thousand cubic feet—a fifth of the price half a century before.

It would be unforgivable, while describing this period, to ignore the vision and achievements of three men who were destined to mould much of Birmingham's history. The first of these was Sir Josiah Mason who, by his great determination and character, rose from the humble circumstances in which he was born to become one of the pioneer leaders of industry in Birmingham. His work for the community included the erection of almshouses and an orphanage, and culminated in founding, in Edmund Street, Mason College, intended as a college of the higher education in science. It will be recalled that the seventies marked the beginning of the fundamental renaissance of the physical and natural sciences which developed over the next fifty years. Mason, although not entirely original in his work, Owen's College at Manchester having preceded his college by twenty-five years, nevertheless supplied an endowed centre of higher education which was sorely needed at that time, and provided a means of progress for many a young man destined to mould the city's history.

The other two pioneers of Birmingham's industrial development were the Cadbury brothers, Richard and George, who



d Mayor, Alderman A. F. Bradbeer, J.P.

Councillor Seymour J. Brown, Chairman of the Gas Committee.

G. C. Pearson, O.B.E., M.Inst.C.E., M.Inst.Gas E., Engineer-in Chief.

staggered Birmingham—and, indeed, much of the country—by moving their business lock, stock and barrel four miles out of the city. This they did in 1879 and since then the name of Bournville has become famous the world over, not only as the source of an enormous chocolate and cocoa supply, but as an example of how concern for employees' welfare and a keen sense of beauty and orderliness can bring a rich financial reward. The Bournville Village Trust, the Selly Oak Colleges, and the many educational and recreational facilities provided by the brothers and their descendants make their work a testament to their faith and an example to the world.

The period from the 1880's to the present day has been one of continuous activity and progress, which has constantly kept pace with the parallel progress in industrial methods and the growing population. After the Consolidation Act of 1883, Birmingham was able to tighten its administrative authority and there opened a period of steadily increasing legislation, consisting of both national Acts and purely local Acts and Provisional Orders, with statutory force. These new powers were felt in a number of ways: by the application of accepted principles in the fields of lighting, paving, health, and sewerage; by providing facilties for improved education; and by utilizing a newly discovered source of power—electricity.

Like any rapidly expanding industrial centre, Birmingham was constantly threatened by uncontrolled and inferior building and the control of this mushroom growth of back-to-back houses (they were not prohibited by statute until 1929), thirty or forty to the acre, needed to be firm and alert. In contrast to the inferior building of workers' houses, the public huildings of the time were conceived with foresight as to their purpose and an appreciation of their importance in their design. Most were connected in some way with education and the establishment of the Municipal Art Gallery, the Municipal Central School of Art, and the first Tenchnical School (housed at first in the Birmingham and Midland Institute, and later in Suffolk Street) closely followed one another. Perhaps the new Law Courts in Corporation Street, opened by Queen Victoria in the year of her Jubilee, 1887, may also be included as an "educational" facility. In the same year the town became a County Borough and two years later, a city. Shortly afterwards the Mayoralty was promoted to the highest status, the first Lord Mayor of Birmingham being Sir James Smith.

Among the most important events of the end of the nineteenth century was the carrying out of the Elan Valley Water Scheme. By 1890 it was clear that the City's existing water supply was insufficient to meet the demands made upon it and the technical genius of Mr. Mansergh was called in to put the new scheme into operation. The task was a tremendous one, the catchment area covering nearly 46,000 acres, with a 73½-mile aqueduct, 12 miles of tunnels, and at least 1,500 miles of distribution mains. In 1904, for the first time, Welsh water was used in the City.

Town Planning

When the creation of Greater Birmingham was proposed in 1888 it failed owing to the opposition of the areas to be absorbed; two years later, when the idea was revived, it again failed. But in 1891 Balsall, Heath, Harborne, Saltley, and Little Bromwich were incorporated, thus adding 4,000 acres to the extent of the City and bringing the number of the Council up to seventy-two. It took a long and arduous battle to secure the Royal Assent in 1911 which enlarged the Greater Birmingham area to 43,600 acres and its population by 315,000, due to the inclusion of King's Norton and Northfield, Yardley, Aston Manor, Erdington, and Handsworth. It thus became the second largest city in England.

The enthusiastic Town Planning Committee, propelled very largely by Neville Chamberlain and George Cadbury, the younger, devised a series of schemes to lay out the newly-acquired land in an orderly and efficient manner. Meanwhile amenities in the city were undergoing something of a change. The tramways were acquired as a municipal undertaking in 1913, and ten motor omnibuses appeared on the roads. The immediately preceding years had seen the acquisition and extension of an electricity supply for lighting and power which had simultaneously launched itself into battle with the original gas services. The outcome was, of course, that gas surrendered much of its lighting load and gradually undertook a greater part in industrial processes.

It is impossible to leave the story of Birmingham as a city in order to concentrate on the growth and activities of the Gas Department without relating the facts leading up to the establishment of the University of Birmingham, one of the city's most precious possessions and one to which the whole world owes a debt of gratitude. In 1892 Mason's foundation absorbed the medical functions of Queen's College and it soon became clear that larger facilities would be necessary in order to meet the requirements of the time. A difference of opinion arose over the remedy, some advocating a revised trust-deed and a rejuvenated Mason College, while others pleaded for a University

Council House and Colmore Row

which would absorb the existing College. Champions of the latter view were Professor E. A. Sonnenschein, founder of the Classical Association, and Sir G. Kenvick, who, in turn, obtained the sympathies of Joseph Chamberlain, then at the peak of his career. It was Chamberlain who attacked the suggestion that Mason College, suitably improved, should join the federal Victoria University of Manchester, Liverpool, Sheffield, and Leeds, and brought about the Birmingham University Act, which was passed in 1900. He was also responsible for the site at Edgbaston for the new University, raising the money for the necessary buildings and endowment, and arranging that Sir Oliver Lodge should become the first Principal.

And so this skeleton history of the City is almost complete, a history of the joint development of a great industrial City and of democratic self-government. In its story may be read the story of the industrial revolution and of how the aesthetic abilities of the people have kept pace with their purely mechanical development. For to-day, although Birmingham cannot rank as one of our most handsome cities, it yet has its imposing buildings and dignified streets. The Town Hall is in the style of a Greek temple and, with its magnificent organ, has been the scene of many great musical festivals; St. Martin's, the parish church, dates from the thirteenth century.

Opened in 1916 and originally intended to promote war savings and to enable the poorer citizens to contribute small weekly sums, the Municipal Bank—the only one in Britain—is typical of the better architecture of the period, while the new Civic Centre is equally attractive. The City has its own airport, fine medical services and facilities for the aged—nor must we forget its football teams, for Aston Villa, Birmingham, and West Bromwich Albion are household words. It is fitting that this industrial beehive should be the scene of the annual British Industries Fair, England's shopwindow to the world. Truly, Birmingham is the capital of the Midlands.

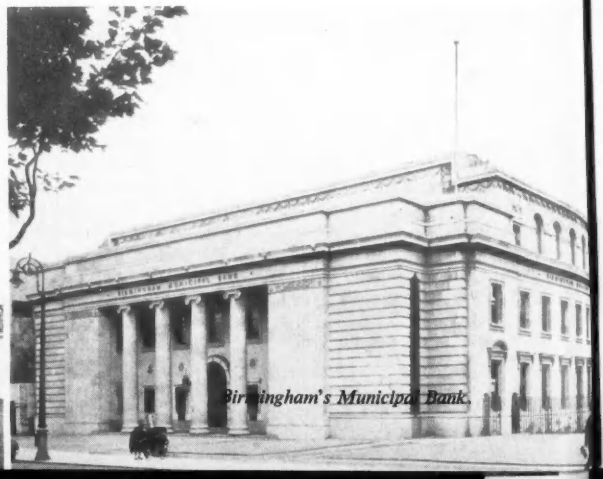
The Growth of the Gas Department

We have already given a brief description of how gas was first used in Birmingham and of the ups and downs of the early gas companies. The growth of the Gas Department has been difficult, for although the demand for gas has steadily increased, until now it is ten or eleven times the 1875 figure previously quoted, accommodation in the City has been difficult and enlargement almost impossible. Three central works, once so well-spaced and ideally suited to their task, now appear almost huddled together and incapable of elbowing themselves more space. The small Adderley Street works, previously described, was a source of irritation for years, it being necessary to convey coal by tractor and trailer from Landor Street Goods Station. In 1940 the works shut down and the site was used only for four holders and a booster station.

The largest of the remaining four works is that at Windsor Street. Occupying three times its original area, the works has been completely modernized, and it is interesting to note that the present installation of four ranges of continuous vertical retorts, producing 23 million cu.ft. daily, occupies only two thirds of the retort house which, sixty years ago, when equipped with six ranges of horizontals, produced only a third of the present make of gas. Similar changes have been made at the other three works and vertical retorts are now common throughout. Labour has been cut to a minimum and mechanical handling has taken the place of the old laborious methods. Nechells will be the second installation in the country of the new tower purifiers. Here in one-third of the space occupied by boxes, twelve towers, each 22 ft. in diameter and 61 ft. high and served by a 60-ton crane, will have a capacity of 23 million cu.ft. daily. Carburetted water gas plant at the three central works is entirely automatic, producing 3 million cu.ft. per day at Saltley, 9½ million at Windsor Street, and 14½ million at Nechells.

The isolated member of the family is the Swan Village works, whose chief job is supplying Wednesbury and Darlaston. Its two ranges of vertical retorts yield a total daily output of 5 million cu.ft., augmented by 2 million cu.ft. of water gas. The latter plant will shortly be converted from hand operation to the automatic methods used at the other works.

A link with the World—the City's Airport



Birmingham's Municipal Bank

The impressive Hospital Centre.

The new Civic Centre.

In 1935 the City of Birmingham Gas Department became responsible for the supply of gas to the Coleshill area to the east of the City. It was decided to use the original holders for storage purposes and so a small boosting plant was installed to fill them during periods of low consumption.

A glance at the diagram of this distribution system on the back page will show the two island areas of Darlaston and Wednesbury, to the north-west and completely disconnected from the City's main area. The history of this apparent isolation is interesting since it recalls an item of gas company history already described. It will be remembered that in 1875 the Birmingham Corporation acquired the Birmingham Gas Light and Coke Company and the Birmingham and Staffordshire Gas Light Company. The Birmingham Corporation Gas Act of that year gave to the other local authorities the right to acquire those portions of the undertakings within their respective boundaries. All complied except Wednesbury and Darlaston, and they are therefore supplied by a trunk main from the Swan Village works, which itself feeds gas back via a booster main to Great Barr, where governors regulate the flow of gas into the City's low pressure mains.

So great have been the developments in the area served by the high pressure system that the existing system was showing signs of strain. It was therefore decided to erect a new static gasholder at Langbridge. The result was the largest in the country with a capacity of 467,500 cu.ft. of gas, compressed to 73 lb. per sq. in. Partially buried in the side of a hill, the monster—it is 200 ft. in length and 25 ft. in diameter—resembles a grounded airship. Incidentally, it is amusing to learn that, when tested to meet the Board of Trade requirements, the holder was filled with 590,000 gall. of water and the internal pressure of 150 lb. per sq. in. was achieved by using a small hand pump. A short distance away is a high-speed two-stage gas compressor connected to the Windsor Street-Langbridge high pressure main. When the holder is full gas can be fed back into the high pressure booster system, so that the benefit of the holder may be felt over some 80 square miles of territory.

The framework of Birmingham's history, the development of its gas supply, and the present make-up of its works and distribution system have been dealt with, if not in detail, at least broadly. No mention has yet been made, however, of the special facilities for testing and research available at Birmingham or of the complicated structure of administration and sales and maintenance service. First, a word about the Central Laboratories, an acquisition of which the Department is justly proud.

The purposes of the laboratories are too complex to deal with in detail and it is impossible to do more than quote the work of some of the sections. There are special laboratories which are concerned with such subjects as coal assays in a small-scale carbonizing unit, gas appliance testing for the Fittings Section; metallurgical analyses and micro-photographic work for the Physical Testing Laboratory; coal and coke sampling and analyses for the information of the management and engineers; tar, oil, and benzole testing; making special apparatus and instruments by scientific glass-blowers and instrument makers; complete gas analyses; analyses of water and water-softening chemicals; paint analyses; and investigations on purification, corrosion, meter leathers and incandescent mantles. Much of the work is carried out in close collaboration with other research bodies. Birmingham is, of course, an intensely industrial area and it is natural therefore to find increased attention being given to the study of refractories. As well as the analysis and testing of refractories, the Laboratory shares much of its work with the Gas Research Board and the British Refractories Research Association. Similarly, coke-quality testing for control of production is carried on in partnership with the Gas Research Board, while the Midland and National Coke Technical Committees collaborate in the Laboratory's work on the efficiency of coke-burning appliances. The Works Laboratories section is of tremendous assistance to the engineers, sampling and testing coal-gas, carburetted water gas and town gas, supervising the benzole, cyanide, and water-softening plants, and giving assistance and advice. The Central Laboratory was originally created in 1906 and the

Big Brum and the Museum.

Blitz damage to the Head Office.

success it achieved prompted the Committee to erect a new building during 1939. The war delayed the work, but to-day this fine, modern, and well-equipped laboratory is carrying out most important research activities, of the greatest value, not only to the Birmingham Gas Department and the Midlands, but to the whole country.

Also of the greatest importance to the Department is the coal-testing plant whose records mark the steady improvement in carbonizing efficiency throughout recent years. The plant was first erected in 1905 but has been altered and replaced several times. Operating as a full-scale gas-works, the plant, with its exact measuring facilities, has yielded information of much value on carbonization and ancillary processes. Some idea of the scale of this plant can be gauged from the fact that its annual output is 140 million cu.ft. of gas.

Another testing plant of great value to the efficient operation of the works is the apparatus installed at Windsor Street, which can take gas from each quarter-range for separate metering. Thus wear and tear on retorts may be accurately charted, enabling exact planning to be indulged in without leaving anything to chance. Before the calorific value of the gas is tested, a sample of the gas is purified in order to gauge the state of the setting and calculate the thermal yield. Specific coals can be segregated to a quarter section, thus ensuring detailed knowledge of their behaviour and value.

It will be readily appreciated that the amount of maintenance required to service all the appliances of the 350,000 consumers in the Department's area is very considerable, requiring a high degree of organization and efficiency. Every possible means have been used to meet this need and the fine building adjoining the Windsor Street works, with its ample "elbow room" and generous windows, provides ample evidence of the care taken on the consumer's behalf. Here are the stores, maintenance units and repair shops, administrative offices, drawing offices, and repair shops.

Figures are staggering and here are a bunch lumped together for the utmost effect: 200,000 maintenance visits to consumers' premises per year; 190 meter inspectors to attend the 221,951 pre-payment meters, 30 to attend the 131,390 ordinary meters, and 20 to attend the 23,000 wet meters; 400,000 tons of coke distributed yearly; pre-war 80,000 hire purchase agreements were in operation.

Mention of meters is a reminder that the meter repair shops at Birmingham are particularly impressive and the testing operations are carried out on an unusually large scale.

Another asset not to be forgotten is the Physical Testing Laboratories. The original laboratory was launched during the first world war and its reputation spread so rapidly among industrial firms that it was repeatedly improved until now, with its spacious premises in Brasshouse Passage, it is capable of carrying out not only the usual tests of the tensile and torsion variety but such varied investigations as the fireproof qualities of safes, furnace temperature measuring, the thermal conductivity of insulating bricks, and torsion tests on automobile coupling and clutch components and steering gear, &c. The new laboratories have, in addition to a lavish machine shop, micro-photographic rooms, and many other facilities designed to give an ever wider service to consumers and manufacturers alike.

The Human Element

And now a glance at the personnel, at the men and women who make possible the manufacture, distribution, and sale of 93¼ million cu.ft. of gas each day, from Mr. Lee, the General Manager and Secretary, to the most humble "manual," the smallest cog in this vast machine. In the hub of the wheel is the Gas Committee, supported by the Works Sub-Committee and the Finance Sub-Committee; the General Manager and Secretary, acting as adviser, liaison officer, interpreter, and various other equally important roles, forms a connecting link. The Works Sub-Committee's responsibilities are both many and varied: the policy and expenditure of the distribution section and the disposal of all residual materials; the wages and welfare of the works staff; and the regular reports of the Engineer and Chief Chemist—all these and many more are included in normal functioning of this body. The work of the Finance Sub-Committee is more or less self-explanatory, for all statistics and reports submitted by the City Treasurer, Chief Cashier, and the Accountant are weighed and assessed, and their influence upon future plans carefully considered. In addition, this Committee deals with the running of the General Offices and any sections not embraced by the works.

This brings us to the spokes of the wheel, for General Office is a name covering a multitude of cells in the honeycomb: the Cashier's, the Accountant's and Purchasing Offices, and the Meter Inspector's—these are the most obvious. Figures already quoted are sufficient to give some idea of the magnitude of the work of the Cashier's Office, and it is interesting to note that the rendering of accounts has recently been placed on a continuous basis, in place of the original quarterly panics, and also that a new system of monthly payments for hire purchase is in the experimental stage, using duplicate paying-in slips to simplify the usual paper work. The Accountant's Office is concerned with the preparation of the annual accounts, the wage and salary lists, and the collating of all forms of expenditure.

The duties of the works staff will be familiar to all readers and need no elaboration here, but on the sales side there are posts in an undertaking of this size which are less familiar to a person whose experience lies with works of a smaller nature. For instance, the coke salesman is an essential member of the team at Birmingham; remembering the 400,000 tons distributed yearly, the reason is not hard to find. The recent

increased popularity of coke for domestic purposes, due to improvements in grate design, is shown by the 24,000 coke fires fitted by the Department. But for the war this number would have been greatly increased.

In the same way, the size of the undertaking obviously affects the scope and duties of demonstrators and home service advisers. The Home Service Section at Birmingham is a most active one and lectures on housewifery and kindred subjects form an important part of the sales methods of the Department.

Lastly—the gas fitter. How much depends on this ambassador of goodwill! He and his fellows form the rim of the wheel, for theirs is the most direct contact with the consumer. Birmingham's training of fitters is on ambitious lines, and special mention must be made of the facilities recently made available for men returning from the Forces, a subject which was dealt with in some detail in the November issue of "GAS."

It has been truly said that at least half of the success of any undertaking lies in the care and interest it shows in its employees. The harmonious controlling of 4,200 men and women is a test for anyone, and the smooth functioning of the City of Birmingham Gas Department is itself a tribute to the prevailing atmosphere of co-operation and good feeling. Much of the praise must be accorded the Labour and Welfare Officer, whose task it is to be responsible for the manual workers' wellbeing. Apart from keeping all the records appertaining to the health, wealth and value of employees, he is in touch with the trade unions and other relevant bodies. It is rather astonishing to learn that he has time to occupy the post of General Secretary of the Social and Recreation Society.

This is no mean feat, for the Society's activities could hardly be more varied. Four football pitches, three cricket pitches, two bowling greens, and four hard and six grass tennis courts are situated at the magnificent Hollyfields Recreation Ground, where a friendly rivalry between teams maintains a keen interest and a high standard of play. Enthusiasts for swimming, golf, angling, and horticulture, as well as their indoor colleagues who prefer photography, billiards, table tennis, or darts, are also catered for, while the orchestral section has proved its worth at music festivals and concerts.

The Department provides its workers with many facilities: after a year's service manual employees are eligible for the Corporation Sickness and Accident Scheme; the trading section enables members to purchase through the depots at the works a wide range of commodities for their homes; canteens are provided at the works, in the Lord Street building, the Wagon Repair Shops, at Brasshouse Passage, &c. Before leaving the subject, it should be recorded that the Department boasts its own very efficient Fire and Ambulance Brigade, working in units specially trained to protect their own works or buildings.

The War and the Future

It is fitting that before leaving the subject of Birmingham's progress as reflected by its Gas Department brief mention should be made of the influence of the war on the progress of gas supply. There have been so many war stories and this is admittedly little late in the day to recount another. Yet to ignore the tremendous effect of the war on the City would be an unforgivable omission, for here surely is the undeniable proof that good can come out of bad.

How Birmingham's reputation as a maker of munitions first arose has already been described. As a result of World War II that reputation must have been doubled, for the City's output of war materials of all kinds was nothing short of phenomenal. In this drive the Gas Department was in the van. Not only had it to maintain its gas supply under crippling conditions, but many new gas-operated installations were put into use to speed the munitions drive. Furnaces were installed for steel and light alloy forgings, and for carburizing, normalizing annealing, hardening, and tempering component parts.

When it is realized that a quarter of the employees were in the Forces or engaged in some other form of war work, the 4 million cu.ft. waterless holder at Swan Village was unusable, 2,000 railway wagons were requisitioned by the Government, 1,127 mains of up to 48 in. diameter were broken, and the head office received a direct hit, it is difficult to believe that gas output actually increased—in 1944 it was 22.44% more than in 1939.

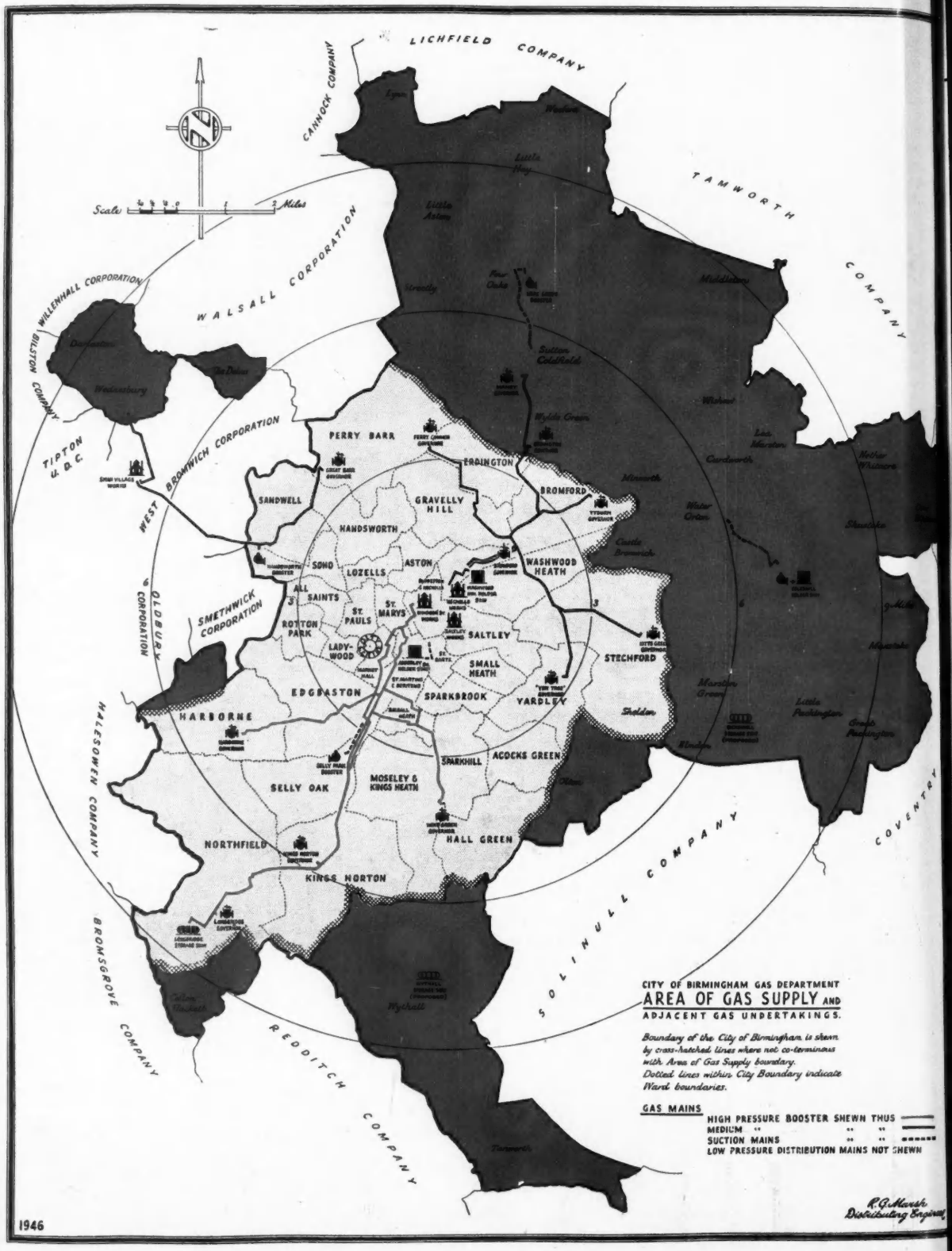
This was only possible by great initiative and all-round co-operation on the part of all concerned with the Gas Department. Crude benzole plants were installed at four gas-works, producing to date 14,485,000 gall., and a pilot plant was put in at the coal-test works to activate coke for making producer-gas to relieve the petrol shortage.

When the war ended, Birmingham was deeply scarred. The housing shortage was—and still is—acute, for 20,000 houses were totally destroyed, and 100,000 damaged. In spite of this and the changeover of factories to peacetime production, the consumption of gas continues to rise. This is due, among other things, to the rapidity with which Birmingham is rebuilding its people's homes, the growth of British Restaurants, and the acute shortage of coal. The annual output for the 1946-47

The spacious General Office at the Council House

period was 30% above the highest pre-war figure, 22,000 million cu.ft.

There seems no reason to doubt that gas consumption will continue to increase. Great Britain is engaged upon a vast export drive to revive her overseas trade. Behind that drive is the manufacturing might of Birmingham, with its miles of factories and works, its flexible communications, its reputation, second to none, as a maker of first-class goods of innumerable types, and its Gas Department, always progressive and equal to the needs of the future, whatever they may be.



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